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EFFECT OF SMALL DOSES OF ALCOHOL ON A SKILL RESEMBLING DRIVING

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Since the drinking of alcohol in one form or another is so common a characteristic of the social life of man in a variety of cultures, it would seem important that as much as possible should be known both of its physiological effects and of its effects on behaviour. In fact, at the present time, very little precise information is available, in spite of an extensive literature on the subject. This literature has been reviewed, more or less comprehensively, periodically since the early part of this century (Fisk, 1917 ; Darrow, 1929 ; Emerson, 1933 ; M.R.C. Alcohol Investigation Committee, 1938 ; Jellinek and McFarland, 1940 ; Drew, 1950).

The most striking feature to emerge from any such review is the marked lack of agreement between authors, amounting in many instances to direct contradiction of one another. This is especially true of the effects of smaller doses. Perhaps not surprisingly, doses of intoxicating strength have generally resulted in deterioration in efficiency in almost all aspects of behaviour tested. For doses below this level, however, the picture is not clear.

Some authors have reported deterioration in performance however small the dose, some have failed to find any effects, while several have shown actual improvements following doses of the order of one single whisky.

In part these discrepant findings reflect the unreliability of many of the results in this field, but in part they arise from the complexity of the effects of alcohol.

For moderate and intoxicating levels it has been established that the effect of alcohol is related to its concentration in the blood, and that the blood alcohol concentration obtained from a given ingested dose depends both on the body weight of the recipient and on the rate at which the alcohol is absorbed into the blood (Winton and Bayliss, 1948). The rate of absorption, in turn, has been found to be dependent on the amount, type, and dilution of alcohol, the contents of the stomach, and the drinking habits of the individual (Goldberg, 1951).

Previous reports further suggest that, apart from a slowly developed tolerance to alcohol from repeated exposure to it over a number of years, known as habituation, there is also a more rapid adaptation to each dose consumed, so that it has a greater effect when the blood alcohol level is rising than when it is falling (Mellanby, 1919 ; Miles, 1924 ; Goldberg, 1951 ; Eggleton, 1955).

The nature of the task used is also important. Goldberg (1943) has shown that some tasks are more readily impaired by a given dose than are others. Familiar tasks, too, deteriorate less than ones that are unfamiliar (Jellinek and McFarland, 1940). The method of measuring change in performance is often of great importance. The additional stimulation provided by a new task frequently enables the subject to compensate, for a short time, for conditions which have produced an overall reduction in his efficiency. For this reason, short interpolated tests may fail altogether to measure this deterioration and may show normal or even above normal efficiency (Drew, 1942). Reasonably long-lasting tests seem necessary unless the deficiency is a gross one. Welford (1951) has stressed the importance, for the analysis of skilled behaviour, of measuring different aspects of performance, since relatively gross measures may obscure changes in the way in which different actions are integrated in the final performance.

The wide individual variations in performance in response to alcohol remaining when the above factors are taken into account have been attributed to temperamental differences, and especially to those differences related to extraversion–introversion.

Differences along this dimension have been noted in other contexts. Extraverts have been shown to be relatively less concerned with accuracy of performance (Himmelweit, 1946), to deteriorate more rapidly during continuous work (Broadbent, 1956 ; Eysenck, 1957a), and to be less consistent in performance (Venables, 1956). It has, furthermore, often been noticed, when giving depressant drugs to psychiatric patients, that a given dose has a greater effect on patients with hysterical disorders than on anxiety and depressive patients. A theory postulating a greater amount of cortical control for introverts and a greater susceptibility of extraverts to depressant drugs due to the reduction of cortical control was first put forward by McDougall (1929) and has recently been extended by Eysenck (1957b). Experimental confirmation of the greater susceptibility of extraverts to the depressant action of amylobarbitone sodium has been published by Shagass (1954, 1956).

The aims of this experiment were to investigate the effect of small doses of alcohol on a complex skill, resembling driving ; to relate any changes found to the level of blood alcohol ; to see whether individual differences in response to alcohol could be explained in terms

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of previous experience or of temperamental differences, when every effort had been made to minimize differences in blood alcohol level; and, finally, to investigate the accuracy with which blood alcohol level could be estimated by measuring the alcohol excreted in urine and in breath. This article is a preliminary report of the main results of the experiment which was carried out on behalf of the Road Users' Committee appointed jointly by the Medical Research Council and the Road Research Board (Department of Scientific and Industrial Research). Full details will be published later by the Medical Research Council.

Experimental Method

In deciding upon the task to be used, two considerations had to be borne in mind: that the task would need to be a continuous one of reasonably long duration, and that such a task runs the risk of becoming extremely boring for subjects. It was finally decided that an apparatus known as the "Miles motor driving trainer" provided the best compromise between a task, performance on which could be scored adequately, and one which had the motivating capacity of a real-life situation.

In this apparatus the subject sits in a dummy car, facing a translucent screen in a darkened room. Behind the screen is a "perspex" disk with a road scene painted on it. This road scene is projected, very much magnified, on the screen by a lamp on the perspex surface. As the driver operates the accelerator and steering-wheel to change his speed and direction of movement, the car appears to progress along the road. The effect is reasonably realistic, and the task bears some resemblance to driving in that non-drivers find the machine difficult to control without considerable practice, whilst experienced drivers have little difficulty with it. Though the central task is very similar to driving, it differs from it in being completely devoid of danger and emergencies. The track used was a continuous winding circuit, the equivalent of slightly over one mile in length. Its repetitive nature was not very apparent to the subjects, and had considerable advantages for scoring in presenting the same objective task to the subjects at all stages of the trial.

The main aspects of performance to be scored were accuracy of tracking, speed of driving, and the control movements of steering-wheel, accelerator, brake, clutch, and gear lever. Of the latter, only steering-wheel and accelerator pedal movements proved worth considering. Accuracy of tracking, measured in terms of deviations from a course parallel to the left-hand kerb, and steering-wheel and accelerator pedal movements were recorded graphically, and simultaneously scored on counters, photographed once each lap. Separate recording was made of the number of collisions of the car with the side of the road; "hunting" movements of the steering-wheel too small to change the car's direction; gear changes; identification marks for lap completion and major corners; and a time mark.

The subjects were 40 volunteers from the staff of the Road Research Laboratory. Their ages ranged from 23 to 40 years, except for one subject aged 58. The mean age was 31 years. Five of the subjects were women. All were in good health and held a current driving licence. The majority reported that they took alcohol only occasionally.

The alcohol was administered orally as analar grade absolute alcohol, diluted to a 20% solution and flavoured to disguise the alcohol content. Haggard, Greenberg, and Cohen (1943) found that the toxic effect of alcohol varied considerably even within the same kind of spirit, owing, apparently, to the presence, in minute quantities, of substances related to the original distilling. They found that, after very careful distilling, absolute alcohol was less toxic than any of the other forms tried. As analar grade absolute alcohol was used in this experiment, it seems probable that the results reported here represent minimum effects for these quantities and concentrations. Equivalent amounts of alcohol taken as beer or spirits could be expected to have somewhat greater effects.

This investigation was concerned with blood alcohol concentrations of less than 100 mg. per 100 ml. of blood, since this is the figure recommended by the National Safety Council of America (1953) as the limit of "safe" and only "possibly under the influence." To achieve these concentrations, doses were given of 0.00 (placebo), 0.20, 0.35, 0.50, and 0.65 g. of alcohol per kg. of body weight. In terms of the concentrations used by Cohen, Dearnaley, and Hansel (1958) these doses represent approximately 18, 31, 44, and 57 ml. of absolute alcohol for an 11-stone (70-kg.) man. The largest dose is the approximate equivalent of three pints (1,700 ml.) of "average" beer or 5 fl. oz. (142 ml.) of whisky for an 11-stone (70-kg.) man.

In view of the expected wide individual variations, and of the difficulty of defining a "correct" performance on such a task as this, it was decided to use each subject as his own control. That is, the effect of alcohol was measured as the degree of change in performance of each subject against his own performance without alcohol. To minimize practice effects, a latin square design was used, each square containing five subjects and five doses. This square was repeated eight times with different subjects. The women subjects were assigned to one square. Each subject was tested on the same day of the week for five consecutive weeks. Thus each subject received every dose.

Subjects were given preliminary practice to familiarize them with the task, and information was obtained on body weight, age, driving experience, and drinking habits. (They were asked not to drink on the evening before a trial.) On the morning of the trial the subject took a fat-free breakfast and 2 to 2½ hours later, at 10 a.m., the first urine sample was collected to provide a check on ketones and residual alcohol and to empty the bladder. (In a subsidiary experiment, urine samples were taken with a full bladder.) He was then given his drink and requested to finish it within 10 minutes. After a further 10 minutes he entered the apparatus and was instructed to drive as he normally would in a real car, and not to stop until told to do so, unless an emergency arose. The subject drove for 20 minutes and then had a 10-minute break, during which the blood, urine, and breath samples were collected. There followed three further 20-minute periods of driving, and 10-minute rest pauses during which samples were taken. Each experimental series lasted 2½ hours.

Approximately 0.5 ml. of blood was taken from the thumb on each sampling occasion, and the blood and urine samples were analysed at the South-Western Forensic Science Laboratory, at Bristol, by the microanalytic modified Cavett method recommended by the B.M.A. Committee (Kent-Jones and Taylor, 1954). Samples taken on the alcohol-free days were usually discarded, but occasionally were used as a check on the analytic procedure. Readings from three instruments for the measurement of breath alcohol were recorded at the time of blood sampling on a number of occasions. The breath analysis instruments used were the "alcometer" (Greenberg and Keator, 1941), the "drunkometer" (Harger, Lamb, and Hulpieu, 1938), and the "breathalyser" (Borkenstein).

The subjects were given a battery of personality tests, from which only the measures of extraversion are considered in this paper. Tests included the Minnesota Multiphasic Personality Inventory, the Maudsley Personality Inventory, and the Bernreuter Personality Inventory.

ALCOHOL CONCENTRATION

Blood Analysis.—The means and standard deviations of each dose, in mg. per 100 ml. of blood, are given in Table I. It will be observed that peak concentrations for the four doses were roughly 20, 40, 60, and 80 mg. per 100 ml. of blood. The doses used, therefore, have been effective in producing concentrations normally regarded as low or "safe." It will be seen from the standard deviations that there is relatively little overlap between the concentrations

TABLE I.—*Mean Blood Alcohol Levels, and Standard Deviations, Following Four Doses of Ingested Alcohol*

Dose	Time After Drinking in Minutes							
	30		60		90		120	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
1. (0·20 g./kg.) . .	23	10	19	9	13	8	6	5
2. (0·35 g./kg.) . .	36	15	37	10	30	9	20	9
3. (0·50 g./kg.) . .	58	14	59	11	51	12	39	10
4. (0·65 g./kg.) . .	74	19	77	12	71	14	62	15

following different doses, implying that the technique of adjusting the absolute quantity of alcohol given to total body weight produces reasonably consistent blood alcohol values. The change in the mean blood alcohol values for each dose through time is shown in Fig. 1. Following each dose, blood alcohol rises steeply to a maximum, reached somewhere between 30 and 60 minutes after drinking, and then falls off in an approximately linear way. There is a tendency for the peak concentration to occur slightly later as the dose increases. That following the largest dose gives a mean time of nine minutes later than that for the smallest. For some subjects, measurements were taken up to six hours after drinking. Dose 1 fell to near zero concentration by the end of two hours, dose 2 at about four hours, dose 3 at rather over five hours, and at six hours the mean concentration following dose 4 was still 20 mg. per 100 ml. Once the peak was passed blood alcohol levels fell, on average, by approximately 10 mg. per 100 ml. per hour.

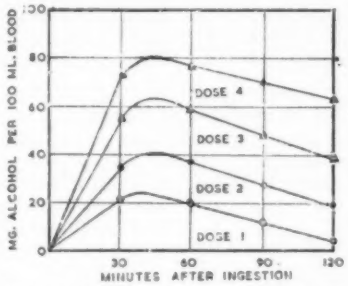

FIG. 1.—Relation between the level of alcohol in the blood and time after ingestion, for four levels of alcohol. Each point is mean of 40 subjects.

Urine Analysis.—Full details of the urine and breath analysis will be given in the main report. The concentration of alcohol in urine built up more slowly, reaching a peak concentration between 20 and 25 minutes later than that in the blood. After the peak was passed the fall-off paralleled that in the blood, the value at any given time being proportionately higher. The overall ratio of urine to blood alcohol was 1.252:1. When the samples were taken with the bladder full, values were slightly more variable, but did not differ significantly from those taken after the bladder had been emptied. Correlating the urine alcohol level with that in the blood 30 minutes earlier, to make an approximate correction for the time lag, gives a product–moment correlation of $r=+0.92$.

Breath Analysis.—Of the instruments used to analyse alcohol in expired breath, the breathalyser proved most satisfactory. It proved highly reliable and gave values corresponding closely to the blood alcohol values, having a constant error of +2 mg. per 100 ml. Some difficulties were experienced with the other instruments used. In 95% of the comparisons the breathalyser values lay within ±21 mg. per 100 ml. of the blood alcohol readings, the drunkometer within ±22 to 26 mg. per 100 ml., depending on the operating technique used, and the alcometer within ±34 mg. per 100 ml.

PERFORMANCE CHANGES

The aspects of performance measured concerned the accuracy of tracking, the speed at which the task was taken, and the operation of the controls.

The accuracy measures consisted, firstly, of tracking error (the amount of deviation across the road surface from a track parallel to the left-hand kerb) and kerb-bumpings (the more serious error of colliding with the side of the road). Secondly, two detailed accuracy measures were obtained—positioning of the car relative to the left-hand side (this was measured on a sample of 10 subjects for no-alcohol and dose 4), and consistency in car positioning at a corner in the circuit (measured, for 35 subjects, as the range of differences in negotiating the same corner on six successive occasions in the second driving period under each dose condition).

Speed was recorded as the number of seconds taken to complete one lap. The total amount of steering-wheel movement made will be the only aspect of control movements considered here.

All scores were expressed as a summed score per lap, and were then averaged over five minutes. The five-minute averages were then summed over 20 minutes. They were subjected to a variety of statistical treatments, including analysis of variance. Regression lines and coefficients of correlation are used here.

The results are presented in terms of group effects, followed by some discussion of individual differences in response to alcohol and their relationship to other personal characteristics. A table of the mean effects of alcohol for each scoring category is given in the Appendix.

A. Group Effects

Practice effects varied in the different performance measures. Tracking error showed very little change with practice, but there was a progressive increase in speed of driving throughout the experiment. Time per lap and tracking error were negatively correlated ($r=-0.39$), but correction of error scores for increased speed makes little difference to the overall picture. Steering-wheel movement shows a pronounced practice effect in a progressive and marked reduction in the amount of movement throughout the experiment.

Effect of Alcohol on Accuracy

Accuracy of steering, in a complex task of this kind, decreases progressively as blood alcohol increases, even with the low concentrations used in this experiment. Furthermore, there is, from the group effects, no evidence of a threshold. Instead, there is a measurable increase in mean error as soon as there is a measurable quantity of alcohol in the blood. The relation between accuracy, expressed as tracking error, and blood alcohol is shown in Fig. 2. This shows the regression of error on blood alcohol. The regression is highly significant ($p<0.001$). This is confirmed by an analysis of variance, which shows a relation of error and blood alcohol significant at better than the 0.01 level of probability. The mean increase in error for the 80 mg. per 100 ml. concentration compared with no-alcohol performance is about 16%.

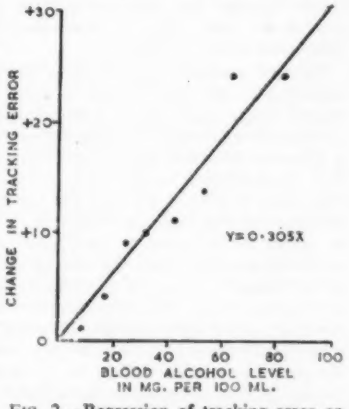

FIG. 2.—Regression of tracking error on blood alcohol level. Each point is mean of 80 paired values.

It has been noted above that blood alcohol concentration shows a characteristic change with time after drinking, showing, first, a steep rise to a maximum value, followed by a slow return to normal. Tracking error shows a very similar pattern with time after drinking. The close corre-

spondence of the rise and fall through time of blood alcohol and tracking error is shown in Fig. 3. In this figure, tracking error scores are expressed as the mean score for each driving period. Blood alcohol concentrations have therefore been expressed in the same way. The rise and fall of urine alcohol, expressed similarly, have been included. The

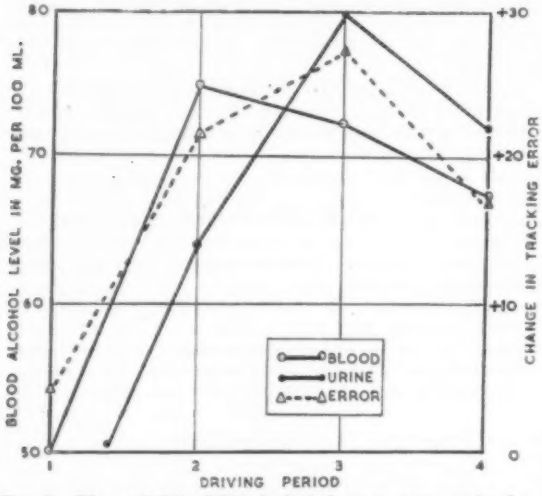

FIG. 3.—Rise and fall of blood alcohol, error score, and urine alcohol with time after drinking. (Urine alcohol levels reduced by one-fifth.) Each point is mean of 40 subjects.

figure for urine alcohol has been reduced by one-fifth (in view of the ratio of 1.252:1) to enable it to be presented on the same scale. Although only the largest dose has been plotted, the data for the other doses follow the same pattern.

It can be seen that urine alcohol reaches a maximum about 20 minutes later than blood alcohol. The error curve looks as though its peak would occur somewhere between the two. The calculation of lag correlations confirms this. Maximum correlations are obtained when error scores are correlated with blood values some 10 minutes earlier, and with urine values some 10 minutes later. From this it would appear that maximum error slightly lags in time behind the maximum blood alcohol and slightly precedes maximum urine alcohol.

Product-moment correlation of the rise and fall of blood alcohol and the rise and fall of error is positive and significant. The mean correlation of the four paired values, calculated separately for each individual, is $r = +0.271$, with p lying between 0.01 and 0.02. The size of this correlation, though significant, seems small. It will be seen from Fig. 3 that there is a time lag between the two variables with an inverted relationship in periods 2–3. This, and the clustering of points in the second, third, and fourth driving periods, probably have reduced the size of the correlation. When blood alcohol values at five-minute intervals, obtained by interpolation from the individual curves, are correlated with the five-minute error scores, allowing a much smaller lag than the 20-minute scores, the correlation rises to $r = +0.89$. Because the test ends before blood alcohol has dropped very markedly, it is not possible from these scores to say whether error scores recover more quickly than blood alcohol levels, though inspection of Fig. 3 shows that the slope of error scores in the last half hour is steeper than for blood alcohol. The frequency of kerb-bumping rises steeply to a maximum, for each dose, with blood alcohol, and falls almost equally steeply after the maximum has been passed.

In an attempt to interpret the increased error with increased blood alcohol, records were sampled for mean position on the road surface, amount of swing about this position, and consistency of behaviour on corners. Significant differences were found. Without alcohol, subjects tended to drive on the left-hand side of the road, to remain on that side for relatively long periods—that is, with relatively little "wobble"—and rapidly to correct swings to the right by moving back to the left once more. The effect of alcohol appears to be to produce a shift of the mean driving line from the left towards the crown of the road ($p<0.01$). With increasing dosage there is an increasing swing or "wobble" about this new, more central position ($p<0.01$), together with a tendency to tolerate swings to the right but rapidly to correct swings to the left ($p<0.01$). There was, furthermore, greater variability in the positioning of the car in negotiating a corner ($p<0.01$).

Effect of Alcohol on Speed

In this experiment there were no clear-cut group effects on speed of driving. Mean driving speeds are insignificantly different for all doses. Variability in speed around a mean shows a tendency to rise and fall through time with blood alcohol rise and fall, but this again is not significant. It is possible that the large effect of practice on speed is camouflaging any alcohol effect for the group. Changes in speed of driving after alcohol were found to be closely related to personality characteristics. These are discussed below.

Effect of Alcohol on Steering-wheel Movement

Like error, steering-wheel movement increases progressively as blood alcohol increases. The regression of amount of change of steering-wheel movement on blood alcohol is shown in Fig. 4. This regression is linear and is highly significant ($p<0.001$). There is also a decrease in the consistency of steering-wheel movement after alcohol ($p<0.01$). The decrease in consistency appears to be due to a greater variability in the timing of responses to a corner.

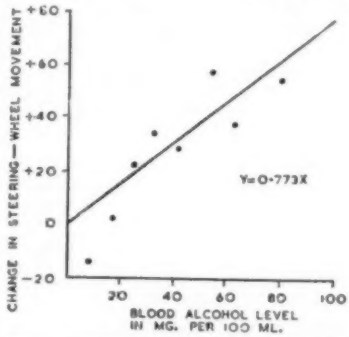

FIG. 4.—Regression of steering-wheel movement on blood alcohol level. Each point is mean of 80 paired values.

As might be expected, the amount of steering-wheel movement is related to the amount of tracking error made. The relationship is U-shaped, such that there is an optimum amount of movement for controlling the car, both less and more movement resulting in increased error. Following alcohol there is an increasing tendency to make either too little or too much movement in negotiating a particular corner, though the predominant effect is to make too much.

B. Individual Differences in Response to Alcohol

Although the latin square design used makes comparison of the performances of individuals difficult, certain features nevertheless emerge. There is undoubtedly a considerable range of individual variation in response to alcohol. This is summarized in Table II, which gives the number of subjects changing their score after alcohol by varying

TABLE II.—*Number of Subjects Showing Different Percentage Change in Scores After Alcohol (Dose 4)*

Measure	Percentage Change of Score											
	Decrease					Increase						
	−50	−40	−30	−20	−10	+10	+20	+30	+40	+50	+60	+70
Error	1	0	2	2	5	10	12	4	2	2	—	—
Steering-wheel movement ..	—	—	—	3	5	12	13	3	3	—	—	1
Time	—	—	4	5	11	13	5	2	—	—	—	—

amounts. The changes are expressed as percentage change from their own no-alcohol score. Tracking error shows a wide scatter. Though the distribution is fairly heavily skewed towards increased error after alcohol, 10 of the 40 subjects show reduced error, one as much as 50% reduction. This subject, however, showed also one of the largest reductions in speed, and achieved a high degree of accuracy by driving extremely slowly. Time scores, on the other hand, are distributed fairly normally around the "no change" position.

An attempt has been made to relate these individual differences in response to alcohol to various personal characteristics. No relationship was found between response to alcohol and differences in initial level of skill, previous driving experience, age, sex, or drinking habits. The subjects varied widely in their initial level of skill and in previous driving experience, so the lack of relationship between these variables and alcohol effect may be stated with some confidence. The range of drinking habits, however, was small, so that the comparison was between the few individuals who drank once or twice a week and those who drank very rarely. The range was therefore too small to draw conclusions on the lack of relationship.

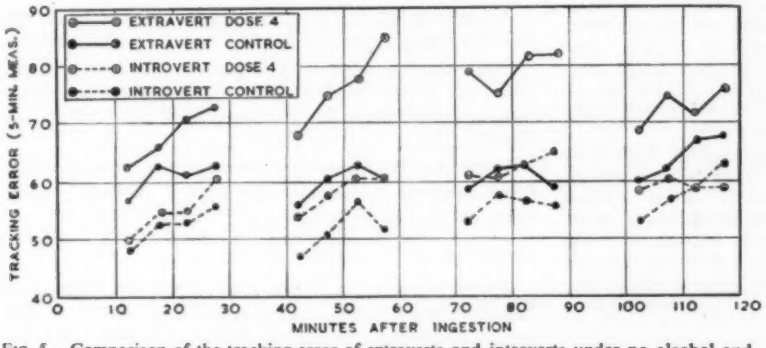

FIG. 5.—Comparison of the tracking error of extraverts and introverts under no alcohol and dose 4 conditions. Extraverts $n=7$; introverts $n=9$.

Scores obtained, for 35 subjects, on the extraversion scale of the Maudsley Personality Inventory were well distributed. The mean was 10.24 (sigma 4.53) as compared with the standard norm of 10.94 (sigma 4.74). Performance scores were compared for a group of subjects scoring high in extraversion and a group scoring low. FIG. 5 shows the mean differences in tracking performance between the resulting seven extraverts and nine introverts. The extravert group made more error ($p<0.05$), were less consistent in car positioning ($p<0.05$), and showed a bigger increase in error during each period of driving ($p<0.01$). The effect of alcohol on error was greater for the extravert group ($p<0.05$), the extraverts having an average increase of 23% and the introverts of 6%.

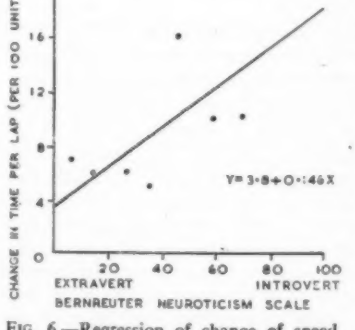

FIG. 6.—Regression of change of speed after alcohol on extravert-introvert score. Each point plotted is mean of five subjects.

The extraverts responded to alcohol in a similar manner, but the introverts showed more varied responses. For example, the extraverts all increased their tracking error after alcohol, whereas two of the introverts made less error. This is especially clearly shown in the effect of alcohol on speed of driving. The extraverts showed very little change of speed after alcohol, but the introverts changed considerably. The nearer the introvert end of the scale they were, the more speed changed. They subdivided, however, into two distinct groups, one of which speeded up very considerably, and the other slowed down. It has not so far been possible to relate this to any personal characteristics. Fig. 6 shows the regression of change of speed on extraversion–introversion as measured by the Bernreuter Neurotic Inventory. This regression is linear and is significant at the 5% level. Comparing those scoring more than 50 on the Bernreuter with those scoring less than this in terms of whether they change speed by more or less than 8 units gives a χ^2 significant at better than 0.01. It would appear that personality characteristics—at least those of the extravert–introvert dimension—are related to the effects of alcohol.

DISCUSSION

It is now generally agreed that a relationship exists between the concentration of alcohol in the blood and the appearance of clinical signs of intoxication. The definition of intoxication based on clinical evidence is, however, a variable one. Liljestrand (1940) gives evidence of a considerable variation in diagnoses made by different clinicians on people who all had blood alcohol concentrations between 100 and 150 mg. per 100 ml. Moreover, the range of blood alcohol concentrations at which people are judged intoxicated is very wide. Goldberg (1951) has shown that the level at which 50% of people are judged clinically to be intoxicated varies with the legal definition in different countries. In America it has been defined by the National Safety Council as 150 mg. per 100 ml., in Sweden it is 100–120 mg. per 100 ml., and in Denmark and Norway 80 mg. per 100 ml.

The level of alcohol in the blood at which people are diagnosed clinically to be intoxicated, besides being variable, tends to be high in comparison with the concentrations used here. This is not surprising, since an estimate of impaired behaviour is made in the absence of any criterion of normal behaviour for that individual, so that the impairment must be obvious before it is detected, and since it is known that people can compensate for their reduced efficiency over the short periods of time during which they are examined. It does not follow, however, that, because no impairment is found in clinical tests, more complex skills, like driving, will also be unaffected.

The present study shows that performance begins to deteriorate with very low blood alcohol concentrations, certainly of the order of 20–30 mg. per 100 ml., and that the deterioration is progressive and linearly related to blood alcohol level. There is, in this study, no evidence of a threshold effect.

The impairment of performance was shown most clearly in the operation of the controls. As the aim of the task was primarily to track, it is perhaps not surprising that in attempting to retain a level of accuracy the operation of the steering-wheel should be most affected. Efficiency in using the steering-wheel is indicated by the amount of tracking error which results. With practice the amount of steering-wheel movement made goes down without a reduction in the accuracy of tracking, whereas after alcohol tracking error increases despite an increase in steering-wheel movement. This suggests that timing of the steering-wheel movements was upset. The decrease in consistency of the movements required to negotiate a corner supports this view. The importance of timing of control movements in a

complex skill has been stressed previously by Bartlett (1943), and adverse conditions such as fatigue have been shown to have a marked effect on timing (Drew, 1942; Russell Davis, 1948).

The work of Cohen *et al.* (1958) is interesting additional evidence. While the task used in this present study reasonably reflects the tracking aspect of driving, it is almost completely free of hazard and risk-taking. These authors have shown that an amount of alcohol not much larger than the biggest dose used in this experiment produced a significant increase in the hazards in which drivers became involved. From the two studies it is reasonable to assume that not only will drivers become involved in greater hazards with this amount of alcohol but they will be less efficient in dealing with them.

It is suggested, furthermore, that the results reported here show that the level of alcohol in the blood is a good indicator of the extent of impairment of performance. It may be pointed out that the blood alcohol levels reported by Cohen *et al.* (1958) seem surprisingly low. Assuming their drivers to weigh rather more than 11 stone (70 kg.), on average, their two doses correspond fairly closely to the smallest and biggest used here. Their blood samples, however, would appear to have been taken almost two hours after subjects began to drink. If this is so, the blood alcohol levels correspond very closely to those found here. They report a concentration of 4 mg. and 58 mg. per 100 ml. for the two doses. At two hours comparable figures in this experiment were 6 mg. and 62 mg. per 100 ml.

While this in no way affects the conclusions reached by these authors about the effect of such doses on performance, it does affect their discussion about "safe" levels of blood alcohol. At the time of the tests the blood alcohol levels in their drivers would almost certainly be at least 10–20 mg. per 100 ml. higher than those reported. Even so, their experiments, and these, suggest a marked impairment of performance on such tasks with blood alcohol levels of 60 to 80 mg. per 100 ml.

In view of the known difficulty of clinical estimates of impairment in such situations, and of the individual's capacity, if he is capable of realizing that he is under test, to compensate temporarily for loss of efficiency, estimation of blood alcohol level would seem the most direct way of assessing impairment. Estimation of the alcohol excreted in urine and in breath allows a close approximation to blood alcohol. In these experiments, urine alcohol agreed very closely with blood alcohol. Breath analysis, which has enormous administrative advantages over both blood and urine analysis, can, from these results, given a suitable instrument, also give a very close approximation.

It would seem fairly clear, from these results, that the efficiency with which a task like driving is performed is likely to decrease progressively as blood alcohol rises. At some point the loss of efficiency is likely to be large enough to constitute a danger in a practical driving situation. As this experiment has been carried out in a laboratory, necessarily free of the hazards and many of the motivating features of a real-life situation, it is not possible, from these results, to say at what level of blood alcohol the increased risk of accident would become unacceptable. Some evidence on this is available from the experience of the U.S.A., Denmark, Norway, and Sweden, where rather different cut-off levels are used.

Individual differences in response to alcohol appear to be related, at least in part, to personality characteristics, especially those of extraversion–introversion. Eysenck (1953) has collected the evidence for the existence of this dimension of personality and has postulated (Eysenck, 1957a) that extraverts would be more susceptible to the effects of depressant drugs like alcohol. The extraverts in this experiment behaved as a group, and tend to confirm Eysenck's hypothesis. The introverts do not behave as a group. It is of interest that all the scales used agreed on the extravert end but did not agree on the introverts. It is possible that the almost bimodal effect noted on change of speed for introverts reflects the intrusion of some other personality characteristic not tested in this experiment. The test which showed this bimodal effect most clearly was the Bernreuter, which uses a more "neurotic" criterion of introversion than the Maudsley.

In this experiment extraverts appear not to be bothered by the extra stress imposed by alcohol. They drive at much the same speed as before, make very little additional corrective movements, but make much greater error, are less consistent, and deteriorate more rapidly during 20-minute driving periods. Introverts, on the other hand, appear to be striving to compensate for the alcohol effect, and to be anxious to demonstrate their efficiency. They over-react to the situation, make more corrective movements of the steering-wheel, and change their speed markedly. Some slow right down, presumably in an attempt to achieve accuracy, though they do not necessarily do so, while others appear to be attempting to demonstrate how quickly they can drive, again not always with a proportionate loss of efficiency.

SUMMARY

An experiment has been carried out to investigate the effects of small doses of alcohol on a complex skill.

Four alcohol doses and a placebo dose were used. The peak blood alcohol concentrations from the doses were approximately 20, 40, 60, and 80 mg./100 ml. of blood.

Urine and breath analyses were compared with direct blood analysis. Urine alcohol peaked later and higher than blood, but breath alcohol followed blood alcohol in time. The ratio of urine alcohol to blood alcohol was 1.252:1.

Three kinds of breath-testing apparatus were used. Best results were obtained from the "breathalyser." The others either showed high constant errors or were unreliable. The results from the breathalyser were good enough to warrant its consideration from a practical point of view.

Mean error showed an increase with increase in blood alcohol, amounting to about 16% deterioration with a blood alcohol concentration of some 80 mg./100 ml. Part at least of the increase in error is to be explained by a significant tendency for subjects to move towards the right-hand side of the road after alcohol and also by less consistent positioning. Error scores and control movement scores also showed a variation in time, rising and falling in a way similar to that of blood alcohol.

Mean speed showed no significant change, but marked individual differences in speed after alcohol were found.

Control movements, as measured by steering-wheel movement, showed significant increases and a significant reduction in consistency.

Age, sex, previous driving experience, and previous drinking habits, within the limits available, showed no relation to individual differences in response to alcohol.

Personality ratings, especially those relating to extraversion–introversion, showed a definite relation to behaviour changes. Extraverts did not change either speed or control movements very much, though they were less consistent in control movements, but showed large increases in error. Introverts changed speed considerably, though it is not possible to differentiate between those who slowed down and those who speeded up. Control movements also increased, but were relatively consistent. Error may or may not increase, but the mean error score was significantly less than that for extraverts.

APPENDIX

Average Scores For Various Aspects of the Tracking Task, After Each Alcohol Dose

Performance Variable	Dose 0	Dose 1	Dose 2	Dose 3	Dose 4
Tracking error	227	230	235	246	246
Kerb bumpings	209	255	350	260	359
Inconsistency in tracking ..	4·82	5·08	5·63	5·78	5·53
Time per lap	403	390	386	393	398
Steering-wheel movement ..	674	673	690	708	764
Inconsistency in steering-wheel movement	3·61	3·51	3·61	4·03	4·15

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The World Health Organization has published its eighth annual volume of vital statistics of various countries for the year 1955 (699 pp., £3). The number of subjects has been increased in order to make possible a more thorough analysis of the factors influencing public health. In some 700 pages the report includes, in addition to the subjects usually covered, detailed specific death rates, by sex and by age, for the main sites of malignant neoplasms (lungs, digestive organs, breast and genital organs, lymphatic and haematopoietic tissues). It also presents for the first time a type of information previously unobtainable—namely, the distribution of cases of communicable disease by sex and by age. Among some other statistics not previously included are the numbers of health personnel in various countries, hospital establishments, and numbers vaccinated against certain communicable diseases in 1955.

SIMPLE CLINICAL HEARING-TESTS FOR VERY YOUNG OR MENTALLY RETARDED CHILDREN

BY

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In the course of an inquiry into problems of deaf and partially deaf children in mental deficiency hospitals and occupation centres carried out during 1955, it became apparent that there was need for a series of graded clinical hearing-tests, suitable for routine application by medical officers and psychologists concerned with official ascertainment of handicapped children, which could be repeated at intervals by different examiners and recorded in some standard fashion. Originally, with the intention of obtaining results as precise as possible, some form of instrumental testing was envisaged, and numerous trials were laboriously carried out with drums, whistles, pitch-pipes, tuning-forks, and, in a few cases, with pure-tone audiometers; but it was soon obvious that the difficulties of routine testing of mentally handicapped children with what were, to them, completely meaningless sounds were insurmountable. Since, in any case, the aim was primarily *to obtain reliable information concerning the child's capacity to hear with comprehension in everyday situations*, it became clear that the tests should be based on his reactions to familiar homely sounds and particularly to "live" speech. It is hoped to give in detail elsewhere the reasons for employing each individual item in the present series.

This paper is intended only to describe the general principles underlying the tests, the materials used, the procedure which was eventually decided upon, and the responses which may be expected. In order to establish comparative developmental standards, it was found necessary to keep checking the performance of mentally handicapped children against that of young normal children attending day nurseries and infant schools, and in the process it was discovered that in these groups, also, the tests could usefully be employed for sorting out children with difficulties of hearing and speech. The tests can be carried out in any quiet room, and the material required is easily obtainable. They are simple enough in content to be readily grasped by young children, but when correctly applied provide clear-cut evidence regarding capacity for auditory discrimination. Since it is essential for adequate assessment to observe *how* the child responds, the tests should be carried out personally by the medical examiner (or psychologist) or in his presence. They are not intended at this stage for large-scale application by ancillary personnel. Suitable techniques are already available for this purpose (Ewing, 1957).

Categories of Hearing-tests

The hearing-tests for children at present in use fall into two broad categories: (1) those which are designed as preliminary *screening devices*, first to sort out as quickly and effectively as possible children whose speech and hearing is below the normal for their age and who therefore require further investigation, and then to provide a means of recording results for future reference; and (2) those more precise *diagnostic procedures* which seek to define more accurately the nature and extent of the speech and hearing disability.

Considerable research has been carried out in Britain on both types of test, notably by the Ewings and their team of workers (Ewing, 1930, 1957; Ewing and Ewing, 1944, 1947), Fry and Kerridge (1939), Dix and Hallpike (1947, 1952), Whetnall (1952, 1956a, 1956b), Fry and Whetnall (1954), Fisch (1955), Dawson *et al.* (1956), and Thomson (1956).

Although I derived much useful information from the published reports then available, few of the tests in use were found to be suited to my purpose owing to the limited intelligence and restricted experience of the children whose needs prompted my own investigations. Statistical evaluation of the tests here described is not possible or desirable. The mental age levels given are approximate, and, although in practice the series provides a considerable amount of information concerning developmental progress, it is not designed for use as an intelligence scale. The terms "pass" and "fail" are not employed. The child is judged to respond or not to respond according to the level of performance which might reasonably be expected at his age. It need hardly be stressed that any child showing deviations from the broad pattern of speech and hearing behaviour appropriate to his chronological age should be referred for expert opinion and full diagnostic testing immediately. Children do not grow out of deafness, but they do most assuredly grow into dumbness if they are not given expert auditory training in the critical early years. The sooner the young child with impaired hearing is provided with a suitable hearing-aid and his parents are given guidance regarding his daily management the better his chance of normal development.

Much research is in progress regarding the auditory behaviour and testing of young babies under 6 months, including neonates (Graham, 1957; Ewing, 1957; Whetnall, 1958; Ballantyne, 1958). These procedures demand much training and experience. Since their application to mentally handicapped children has not yet been investigated, it is not proposed to discuss them here. The present tests are intended for use with children with mental ages between 6 months and 7 years. To date (March, 1958) they have been personally applied with 192 mentally handicapped children aged 2–16 years, and with 537 normal children between 6 months and 7 years distributed as follows: under 2 years, 107; 2–4 years, 179; 5+ years, 251.

Response to Spoken Language

In order to test whether a child possesses hearing over the range of sound cycles which are essential for speech discrimination, it is necessary to satisfy oneself that he can respond to spoken language. His reaction to other meaningful sounds possessing similar characteristics in pitch, intensity, and duration may provide valuable supporting evidence regarding the child's auditory acuity and his ability to interpret the world of sound in which he lives; but until he has given unmistakable evidence first that he *hears*, later that he can *imitate*, and eventually that he can *correctly use* the individual phonetic units of speech, it is not possible to be certain that his auditory discrimination is normal.

From 6 months onwards the child's own spontaneous vocalizations provide a useful clue to his capacity for hearing and using spoken language. They should therefore be carefully observed and recorded at the time of examination. The mother's description of his speech and hearing habits should be reported separately. Even when accurate pure-tone testing becomes possible a clinical speech test should always be given (Sheridan, 1948). Hearing for pure tones and hearing for speech, although closely related, are not identical. This is particularly true of young children. The pure-tone audiogram provides valuable information regarding the severity of hearing loss, the sound cycles involved, and the possible location of the blockage in the auditory relay system between the meatus and the cerebral cortex, but it cannot show how the individual child interprets what he does hear. Some children with poor auditory discrimination and gross speech defects show perfectly normal audiograms, while other children showing loss for pure tones function as normally hearing individuals. While it is therefore desirable to apply and compare results of both tests whenever possible, the first essential is to discover the child's ability to hear and use spoken language or, as Fisch (1957) aptly terms it, his capacity for auditory communication.

The tests are grouped in series as follows:

Baby tests
- (*a*) 6–14 months: Voice and noise-making objects
- (*b*) 15–18 months: " " " "
- (*c*) 19–23 months: Five-toy test

2 years old: Six-toy test and first cube test

3–4 years: Seven-toy test and second cube test

5–7 years: Picture vocabulary tests and third cube test

The materials required are:

Babies.—(*a*) and (*b*) soft high-pitched rattle; squares of new tissue paper (e.g., toilet paper); small handbell; china or pottery cup with wide brim; metal spoon. (*c*) Ball, golf size, plastic type which will not break windows; baby doll 2–3 in. (5–7.5 cm.); motor-car 2 in. (5 cm.); 1-in. (2.5-cm.) wooden cube, different colour from motor-car.

2–4 Years.—Child's spoon, fork, and knife (blunt); baby doll 4–5 in. (10–12.5 cm.); motor-car 3–4 in. (7.5–10 cm.); train or plane 3–4 in. (7.5–10 cm.); ship 3–4 in. (7.5–10 cm.); eight 1-in. (2.5-cm.) wooden cubes, two each of blue, yellow, green, red.

5–7 Years.—Four cards of special pictures; one card decorated with coloured squares; lists of selected words and sentences.

In application three general rules must be observed. (1) The room should be quiet and homely, and the mother or other familiar adult should remain with the child throughout. (2) The tests are based on fundamental psychological and acoustic principles, so that, although it is permissible to vary the spoken "carrier phrases" and in some instances the order of application, the materials used may not be varied and the tests themselves must be applied with strict attention to detail or they will cease to give valid results. (3) The record should state clearly the test used, the distance, the results obtained, and a note regarding the child's own vocalization or speech.

Babies Aged 6–14 Months

Babies over 6 months are comparatively easy to test, those between 9 and 12 months particularly so. At this stage of development the child is eagerly seeking through vision, hearing, and manipulation to explore and find meaning in the world around him. He has already learned to associate certain sounds with human beings and the interesting events they initiate, but his experience is still so incomplete and his ability to discriminate between foreground and background noise so rudimentary that he cannot yet take the significance of any sound within his area of attention for granted, but is impelled to support his uncertain powers of auditory recognition and localization with visual verification. Hence his response to a meaningful sound in his environment is to turn immediately to look for the person or object originating it. This localizing reaction probably plays a necessary part in the child's stereoscopic and stereophonic learning, and thus in the building up of his concepts of space and possibly of time. Whatever the reason, the response is so constant at this age that it is almost automatic and can usefully be pressed into service in testing.

It is necessary to remember that the infant's world is very small and only gradually expands. Although he has vague impressions of an outer space, his span of selective visual and auditory attention is at first fragmentary in time, and in space no larger than the circle bounded by his mother's arms. His sphere of continual awareness later widens to cot and play-pen size, and only at about 18 to 20 months reaches full room size. For this reason soft, varied, meaningful sounds close to the infant are much more likely to evoke a response than loud featureless sounds further away. The examiner (E) should stand well to the side of

the child (C), but outside his immediate range of vision. To ensure the most consistent results the sound stimulus should be given on a level with the ear. Sounds below this horizontal plane seem to be less easy to hear, and above it less easy still. Sounds immediately behind or above the head, particularly when they are in the middle line, appear to be difficult to distinguish and, before 3 or 4 years, impossible to locate. Ewing (1957) has recorded similar findings.

Babies of 6 and 7 months are usually very outgoing and friendly, but after this the near approach of strangers is apt to be unwelcome and acceptance must be won. The examiner should not make boisterous frontal overtures to the child, but should allow himself to be seen moving about at a respectful distance and heard conversing with the mother. The child's reactions to the mother's voice are instructive, particularly when she is addressing herself directly to him.

E should first ask by what name the child is known at home. C may sit on his mother's knee facing outwards, or in his cot or pram within touching distance of her. C's position must not be closer than 4 ft. (120 cm.) to any wall. In all the tests it is essential that E does not stand where his movements or his shadow are visible to C. Similarly, reflections in a shiny surface, light touches, vibrations, currents of air, and even perfumed cosmetics may provide unsuspected clues to an observant child who has learned, of necessity, to make use of them. If an assistant is available E should sit in front of C observing his reactions while the assistant applies the stimuli under his direction. If E is alone he must wait until C's attention is visually attracted straight ahead (but not too deeply engaged) before he begins the test.

The sounds are given at distances from 1½ ft. (45 cm.) (at 6 months) to 3 ft. (90 cm.) (at 9 months upwards) in the following order—voice, rattle, spoon against cup, tissue paper, handbell. The speech sounds are delivered at quiet conversational level. They consist of the low-frequency vowel OO, repeated two to four times (for example, "Oo-oo John: Oo-oo"), and the high-pitched consonant sounds "tit-tit-tit," "ps-ps-ps," "pth-pth-pth," repeated rapidly three to six times. The remaining sounds are given for one to two seconds. The rattle is shaken softly, the tissue paper is rustled quietly, the handbell is tinkled very gently, and the spoon is merely stroked round the inside brim of the cup (see photographs), unless for any reason a sharp tapping sound is needed, when the spoon can be struck briskly against the side.

The child's attention is immediately drawn by the sound of the spoon stroked round brim of cup. (Aged 8 months.)

With normal children of 9 months upwards the first application of the stimulus usually provokes instant turning, often with a delighted smile (E should respond to the smile), and when the same sound is repeated immediately afterwards on the other side of his head C will promptly locate it in the new position. Younger babies may be slower to react. If the first stimulus evokes no response E should wait for two seconds and then repeat it. E should then wait a further two seconds, as C may still turn slowly and deliberately although the sound has ceased. This delayed response is apt to occur also in retarded older children. It is as if there is a definite time-lag between the reception of the sound in the primary auditory area, its recognition in the audito-psychic area, and the initiation of the motor impulse. Probably for a similar reason a baby who has not responded to the single application of a sound on one side of his head will often locate it promptly and correctly when it is repeated immediately afterwards on the opposite side; but I prefer to apply a double (or occasionally treble) stimulus to one ear, since absence or delay in response provides additional information. If no response is elicited to the second (or third) repetition of the sound the stimulus should then be changed or the child will become bored and withdraw from the situation.

I have been interested to note that the cup and spoon and rattle seem to evoke the most consistent responses in young babies, perhaps because these sounds carry a concrete "nearby" meaning—that is, food and manipulative play; while the paper and handbell appear to be more interesting to the older babies whose sphere of memory and attention is expanding. After response to the handbell has been evoked it should be presented to the child, since his use of it as a plaything provides further useful information regarding his ability to comprehend its function and his willingness to make and enjoy sound (Gesell, 1925).

If the child shows a clear-cut response to any three out of these five sounds there is good reason for the assumption that he possesses enough hearing to learn to speak, but it must be remembered that the tests are not fine enough to distinguish partial deafness, particularly high-tone loss, with any degree of certainty. If the child does not respond in the expected fashion to these sounds on both sides, the tests should be reapplied as soon as possible within the following month. If the result of this second test is still uncertain expert opinion should be sought without further delay.

Speech.—From about 4 months onwards the child laughs aloud and vocalizes freely, particularly when his mother talks to him, at first in single sounds such as "ba, ka, goo," etc., and later from 7 or 8 months in a tuneful repetitive babble of the "dad-dad, bab-bab, mam-mam" variety. By 10–12 months most normal babies show by their behaviour that they understand several words used in familiar context, and their mothers may report that they can say one or two words, but these are rarely intelligible to outsiders. At 14 months many children have acquired two to six recognizable words, but others, equally intelligent, have not. By this time babbling has progressed to a more complicated jabbering, which possesses all the complex cadences of ordinary speech without its phonetic discipline. This the child practises with tireless enthusiasm when alone

(Sheridan, 1945). Any report of decrease in vocalization from the babbling stage onwards, or the most tentative suggestion on the mother's part that the child's cry is unusually monotonous, or that he seems inattentive to sound, should be treated with the utmost respect.

15–23 Months

Children within this age group are often very difficult to test and the examination calls for much patience and experience. In fact, if the response to the first test is uncertain and if there is any reason to doubt that the child's hearing is normal, it would be wise not to delay until a second test can be carried out, but to refer him immediately for diagnostic investigation. At this age the child is usually very active in crawling or running about, and, since to restrain him would defeat the possibility of reasonable assessment, it is often necessary to follow him round the floor. By this time he usually possesses enough auditory experience to recognize and interpret the sounds used in the baby tests described above without needing to verify them visually. He may concede one brief glance, but frequently does not offer the slightest sign that he has heard. At the same time he may not yet be sufficiently advanced to be able to co-operate in the simplest form of toy test described below. In these circumstances the child's own spontaneous vocalizations may provide the most useful indication of his ability to hear speech. Indeed, E's imitations of C's own vocalized sounds may be the best way of provoking him to stop, listen, and turn to look.

The child between 15 and 18 months should first be addressed by name and invited to join E in play. If he does not respond to these spoken overtures the baby tests at 3–6 ft. (90–180 cm.) may be tried, E remembering that it will be necessary to vary them frequently, as the immediate repetition of a sound which has just evoked response on one side will seldom, at this age, arouse equal interest on the other. The rustling of the paper wrapping of a packet of sweets followed by the spoken invitation "Come and get one," and the presentation of the bell accompanied by the definite instruction "You ring it; ring it with the other hand," are useful extensions of the baby tests at this age. Commands are more likely to produce results than mere friendly suggestions.

With children over 18 months a beginning may be made with the simplest form of toy test—that is, "the five-toy test." The objects used are *cup, ball, miniature motor-car, plastic baby doll,* and *toy brick*—that is, coloured inch (2.5 cm.) cube which should be a different colour from the motor-car. C is placed sitting or standing by a small table with E facing him at 2–3 ft. (60–90 cm.)—that is, conversational distance. E presents the objects slowly in the following order, saying, "Here is a *cup*" (the responsive child will delightedly echo "tup"). "Here is a *ball*—and a motor-*car*." Then presenting the doll E says, "What's this?", waits for C to say "dolly" or "baby," and thereafter uses C's own word. If C does not speak E says, "A *dolly*—and here is a *brick*" (the word "brick" is acoustically essential and must not be altered). Then, holding out his hand flat (*not* suggestively cupped), E says in this order, "Give me the *ball*, please. Thank you. Give me the *brick*, please . . . the *car* . . . the *dolly*—Good." If the child does this correctly E hands the cup to the mother and says, "Now I am going over there and you're going to give the things to Mummy when I tell you," and retreating to 6 ft. (1.8 m.) says, "Give Mummy the *ball*," then, slowly retreating to 10 ft. (3 m.), "Give Mummy the *brick* . . . the *car* . . . the *dolly*"; then, finally, "Put the things in the cup and bring them to me." Many normal children of this age find it difficult to maintain rapport at 10 ft. (3 m.). If E feels that he has dropped out of C's world at 10 ft. (3 m.), he should return to 6 ft. (1.8 m.), noting this in the case record.

If the child does not give the correct toy when requested E should wait a moment without speaking, as another delayed response may be operating. C may even lift the incorrect toy, then put it down and hand the correct one. If C gives an incorrect toy E should put it down gently and repeat, "The *ball*, please." If C still hands the incorrect toy E puts it down again saying, "No, I want the ball, please." If the child persists in giving the incorrect toy or goes on handing the other toys without waiting for the command, E accepts them; then, giving the cup to the mother, holds out the toys to C, saying, "Give these to Mummy." While C is doing this E retreats to 6 ft. (1.8 m.), saying, "Good; now put the things in the cup and bring them to me." While C's attention is momentarily engaged in filling the cup the vocalized sounds "ps-ps" or "tit-tit," the high-pitched rattle, or the rustle of paper usually provoke the turning response.

Speech.—By 18 months most children have acquired 6 to 12 recognizable words. The child continues to jabber to himself while he is playing or in his cot, but as his vocabulary grows this jabbering begins to include an increasing number of distinguishable words. By 2 years the hearing child can verbally communicate his toilet needs, ask to be taken for a walk, and demand what he wants at table. He is usually putting two or three words together to form simple sentences. His understanding of spoken language, which is related to familiar objects, activities, and emotional states in his daily life, continues to improve rapidly and is far in advance of his ability to use speech. At this age he is physically restless and vocally demanding, incessantly provoking his mother to give verbal reply to his loudly expressed claims on her attention. After 20 months persistent tendency to tug at his mother's garments and point silently with his finger when he wants anything is very significant and should be carefully followed up.

2 Years

The testing of children of this age group is easier again, and the six-toy test is applicable. C is invited to a small table with E sitting facing him as before. The toys are briskly presented in this order: Here's a cup—what's this? (spoon) and this (ball, car, doll), and here is a brick. "Give me the *ball*, please, the *brick*, the *car*, the *doll*; thank you. . . . Look, I'll put the *spoon* in the cup. Now you put the other things in when I tell you." E retreats to 6 ft. (1.8 m.) and, hiding his mouth lightly with a card so that the child is unable to see his lips, continues, "Put the *ball* in the cup. Put the *brick* in the cup, the *car*, the *doll*. Good. . . . Now, when I say so, you take them out again." E retreats to 10 ft. (3 m.) and says, "Take out the *spoon*, the *brick*, the *doll*, the *car*. What's left in the cup?" This is an advanced language concept. The outgoing child usually picks out the ball promptly, saying delightedly, "Ball." The reserved child leans forward and looks into the cup without speaking. The dull child looks at E uncomprehendingly. To reassure him E says, "Take out the ball." A quiet conversational voice is used throughout. I seldom use whispered speech for children under 4 or 5 years, and only then for special reasons and with previous notice. Whispered speech is an unnatural form of communication for young children who are accustomed to hearing voiced speech at "mother-distance"—that is, at high decibel intensity. It not only tends to confuse them, but sometimes provokes anxiety and even tears, thus jeopardizing rapport or destroying it irretrievably.

In order to make sure that the child has no high-tone loss, however, it is desirable to test his hearing for voiceless consonants. The following simple test, the first cube test, can be used from about 2½ years onwards. E places the cup and six coloured inch (2.5 cm.) cubes before C, saying, "Now we're going to play another game. See these bricks. When I say, 'In, in, in,' I want you to put a brick in the cup. It will get quieter and quieter, like this (demonstrating). You try." E gradually drops out the vowel and sounds only the consonant—"In, in, n, n, n. Good. Now I'm going over there, and when I say, 'Lift, lift,' I want you

to lift a brick out of the cup and put it on the table. It will get quieter and quieter like this" (demonstrating). E moves to 10 ft. (3 m.) from C's right ear. "Ready? Lift, lift, ift, if, -f, -th (th voiceless as in 'thin'). Good." E then repeats the test for the left ear. C should not be allowed to lip-read. The sounds must be delivered at irregular intervals in order to prevent automatic performance. In practice this will be found exceedingly simple, as it is possible to monitor the child's movements visually to a split second. If C lifts the brick before the signal, E says, in playful admonishment, "I didn't say anything. Put it back. Listen." The children greatly enjoy this game, and it is a very sensitive test.

Speech.—If C's own speech has not been completely demonstrated by this time it may be necessary to engage him in some simple conversation, or, if he is capable of it, he may be asked to point to and name objects or pictures. The following simple "doll" vocabulary list provides a useful rapid test for most of the common vowels and consonants. *Doll, shoe, nose, frock, arm, feet, hair, hand, mouth, eyes, teeth.* Although at this age the normal child's phonetic usage still shows numerous infantile substitutions, his speech is adequate for most domestic occasions. Self-talk during play still continues and will probably do so until about 3½ years. Although not yet capable of sustained conversation the child can now put words together to form more complicated sentences, and is beginning to engage in spontaneous verbal interchange with other children of his own age, as well as with adults. Any child whose speech development during the first three years does not progress in this way, but remains arrested at the jabbering stage, should be referred for expert examination whether or not he appears to hear normally. He may be generally retarded or he may be a case of developmental aphasia, but he may also be suffering from high-tone deafness, so that, although he can fully appreciate the cadences and vowel sounds of ordinary speech, he cannot discriminate, and therefore cannot imitate the difficult high-frequency consonants. Denied the ability to communicate, he may express his frustration in violent temper tantrums, or in despair take refuge in silence or social withdrawal. This type of deafness is likely to be permanent. These children, unhelped, run a real risk of being wrongly diagnosed as maladjusted, psychotic, or mentally defective (Sheridan, 1944; Minski, 1957).

3 and 4 Years

The seven-toy test is easily applicable from 3 years onwards and can be used until the child is able to cope with the more comprehensive picture vocabulary test. It has shown itself capable of holding the interest of mentally handicapped children up to 16 years and, if necessary, of normal children up to 7 or 8 years. The seven objects are a child's *spoon, fork,* and *knife, doll, car, train* (or plane), and *ship.* A slightly larger doll and car at this age are advisable as they are easier to handle (and harder to put in the mouth), but the smaller ones can still be used. Sitting opposite C at the table, E places the toys before him from C's right to left, in the following order—car, train, fork, spoon, knife, doll, ship. E asks C to name the objects as they are placed. If C says "engine" or "boat," E replies, "Yes, a train" or "ship." If C does not speak E says the name clearly, asking the child to repeat it before he passes to the next object, checking him again at the end of the line. If C speaks readily but shows momentary confusion between knife and fork, E should go back to these at the end of the line. If the child still shows the slightest doubt it is wise to discard the test rather than modify it and to give the six-toy test instead. If C knows all the objects, E says, "Show me" (or if C is sufficiently advanced, "point to") "the *spoon,* the *doll,* the *fork,* the *car,* the *knife,* the *train,* the *ship,* the *spoon,* the *car,* the *ship.*" It is essential that the words should be called in this order. E then retreats to 10 ft. (3 m.) and, covering his mouth, repeats the list in the same order.

(It will be obvious to those experienced in psychological testing of children that this simple performance provides E with a good deal more information than C's ability to discriminate the phonetic units which compose the seven words involved; for instance, his use of his right and left hands, his interest, speed, manipulative skill, and his actions which demonstrate "definition by use.")

In order to test the hearing for high frequencies E may repeat the test in a whisper at 10 ft. (3 m.), having first warned C what to expect. A more sensitive test is the following—that is, the second cube test. E places on the table before C the cup containing eight coloured inch (2.5 cm.) cubes with the instruction: "Whenever I say a little sound, oo, sh, t, anything—I want you to take out a brick and put it on the table, like this" (demonstrating): "Oo—ee. . . . Now you go on: sh, t, s, p, f, th. Good. Now I'm going over there," etc. Each ear is tested separately at 10 ft. (3 m.) as before. This is not only a more sensitive test than the "In, lift" one, but it is also more difficult, particularly for retarded children, because it includes the two plosives *t* and *p* as well as the continuants *sh, s, f,* and *th,* thus involving appreciation of duration as well as of pitch. If the child does not respond to the first delivery of *t* or *p* E should repeat the sound once. If response is still absent E should proceed to the next continuant, adding a further *th* at the end to compensate, so that the child is unaware of his lack of success. The case record should be noted accordingly. It will be obvious that the "placing" of these consonants by the speaker is important. In order to keep the sounds at their highest pitch, the short vowel "i" should be imagined as preceding each consonant—for example, (i)sh, (i)p, (i)th. It is essential to avoid "per" and "ter."

Speech.—The child of 3 years is capable of sustained conversation. His speech is usually completely intelligible, although it still shows a number of infantile substitutions and omissions, the majority of which gradually disappear before 5 years. About 3½ years self-talk during play tends to merge into a sort of running commentary of passing events, interspersed with questions, more or less vaguely addressed to the adults and children in his vicinity, to which he expects his hearers to pay at least intermittent attention. About 4 years comments become less frequent but more pertinent, while his questions become more persistent, so that he is incessantly asking, "How? When? Why?" Any deviation from this broad developmental pattern occurring in children of 3 and 4 years is likely to be of serious significance and requires urgent investigation.

5–7 Years

It is usually quicker and more convenient to use a picture vocabulary test at this stage. Those who have tried to design similar tests in the past will know that their preparation involves considerable labour. The words used must be monosyllables, preferably nouns capable of pictorial illustration, and within the experience and language capacity of very young children. M. Reed kindly provided me with a set of the admirable pictures he designed for use in the audiology unit, Gray's Inn Road (Whetnall, 1952), but they proved too difficult for the mentally handicapped children. It was therefore necessary to compile new sets of words and pictures. Six lists of 12 words were prepared. Four of these lists contain an assortment of vowels and consonants in common use. The fifth list contains pairs of words which have similar vowels but different consonants, and the sixth list is composed of words in which the high-pitched vowels *ee* and *i* are combined with high-frequency consonants. Pictures to illustrate three of the lists (given below) were prepared by a children's artist. They were then carefully arranged on the page to prevent guessing from juxtaposition.

The clinical value of spoken vocabulary tests is high. Some children are able and willing to cover the distal ear and repeat a list of words spoken at 10 ft. (3 m.) into the proximal ear, without further ado. If an assistant is available to sit by the child and check his responses, this test,

combined with the third cube test described below, provides a very convenient and rapid method of screening the everyday hearing of normal 5-year-old school entrants. It is noteworthy, however, that even the most intelligent of the 5-year-olds appear to enjoy the test and give a better performance when the pictures are presented, as if, like the babies, they still feel the need to reinforce their hearing of words by visual verification when they are isolated from context.

Since it is the speech sounds in the highest frequency ranges which usually provide the greatest difficulty, the quickest way to discover if the child has any impairment of hearing is to present the sheet representing the sixth list and ask him to point to the pictures. At first the whole 12 pictures in this set were used, but later six (seat, feet, ship, fish, pig, chick) with a two-word check were found to be sufficient. In any case of doubt the longer lists should be given. As before, E starts by sitting opposite C at 3 ft. (90 cm.) asking him to identify the pictures in turn. If C says "chair" or "bird," E replies, "yes, a seat"; or "chick." If C stumbles over any word he should be taken back at the end to this picture. If he still shows any hesitation, the vocabulary test should be discarded and the toy test presented instead. If C identifies all the pictures correctly, E retires to 10 ft. (3 m.) and, with his mouth hidden as before, delivers the list in the order given below.

In order to check discrimination for high-frequency consonants, a *third* variation of the *cube test* was evolved. C is given the cup containing eight cubes as before, two each of green, red, yellow, and blue. Beside the cup on the table is placed a card measuring approximately 8 by 12 in. (20 by 25 cm.) decorated with 12 brightly coloured squares, three each of the same four colours. C is told to stand sideways with one ear towards E and to cover the distal ear firmly with the palm of his hand, placing the fingers in the nape of the neck. He is then instructed to take out a brick as before and "put it on its own colour." This procedure not only adds to the interest of the test, it also acts as a visual distraction. Children of this age are quick to interpret any raising of the eyebrows or least movement of the head which E makes in delivering the sounds. If C shows the slightest lack of comprehension or confidence, the coloured card should be removed and the easier second cube test given instead. A fair indication of the child's probable school-room hearing for continuous speech, allowing for the quieter conditions of the examination, may be obtained by asking him to repeat a few of the sentences below, delivered in a quiet voice with mouth hidden at twice the distance of his seat from the teacher's desk.

Speech.—The spoken language of the normal 5-year-old is fluent and correct. A number of children, particularly boys, still show minor consonant substitutions, principally confusions of *th* and *f*, which are usually the last phonetic units to be differentiated, but occasionally of *s* and *t*, or of the *r, l, w, y* group. These minor immaturities of speech normally clear up before the age of 7 years. If they persist, audiometric assessment and speech therapy become imperative.

Specimen Vocabulary Lists

Picture Tests

General: Shoe, horse, cart, seat, cup, frock, cat, bike, face, chick, fish, ship.

Vowels: House, coat, pin, book, cart, boy, horse, cat, pen, bike, cot, bear.

High Frequencies: Tree, chick, feet, leaf, fish, key, ship, teeth, pig, seat, dish, wheel.

Sentences

The father caught a bus.
The girl ate all the sweets.
The postman rang the bell.
The teacher made a picture hook.
The kitten climbed the Christmas tree.
The baby slept in a cot.
The boy has three big sisters.
The driver stopped the train.
The wind blew away the nurse's cap.
The new dog liked to sleep in chairs.

Summary

A series of simple clinical auditory screening tests which have been found useful in the preliminary assessment of the everyday hearing of very young or mentally handicapped children is described. The material required (common household objects—toys and pictures) is listed. A brief summary of normal speech development during the preschool years is given.

The work described in this report would not have been possible without the generous help of many colleagues and friends in hospitals, public health departments, and schools. It is impossible to name them all individually, but I wish particularly to acknowledge my debt to the consultants and members of the staff of the Cell Barnes Hospital, Great Ormond Street Hospital for Sick Children, and the audiology unit of the Royal National Throat, Nose and Ear Hospital who allowed me to work in the wards or observe in clinics; also to the Medical Officer of Health of London, Manchester, Cardiff, and Cornwall County Councils, who granted me facilities to try out the tests in day nurseries, occupation centres, and infant schools. Mr. M. R. Sheridan made helpful suggestions.

Arrangements are being made for distribution of the material described in this paper through the agency of the National Foundation for Educational Research, 79, Wimpole Street, W.1.

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The results of successive surveys of smoking habits show that a person's replies are fairly consistent with each other. This is one of the conclusions reported in *Research Papers No. 2* on "The Reliability of Statements about Smoking Habits," by G. F. Todd and J. T. Laws, issued by the Tobacco Manufacturers' Standing Committee. Successive inquiries showed that replies given in the course of interviews during 1946–9 overstated the amount smoked by about 11%, and in the years 1952–7 understated it by about 13%. A possible explanation for this given is that the earlier figures, although intended to refer to packeted cigarettes, referred also to hand-rolled cigarettes owing to ambiguity in the questions. After 1950 the report states that the figures suggest that informants had an inherent tendency to understate their consumption slightly. "On the other hand, since in most tables in the papers informants are classified into broad groups consisting of non-smokers of cigarettes and of smokers of 0–4, 5–14, 15–24, and 25 or more cigarettes a day, the percentage of smokers, particularly in view of the proportion smoking 10 or 20 cigarettes a day, likely to be classified wrongly even with a 15% error is negligible. For instance, if those who said they smoked 20 cigarettes a day in fact smoked 23 cigarettes day, they would still be placed in the same consumption category." An analysis of other figures showed, according to the report, that the number of cigarettes stated to have been smoked on the day before an interview can reasonably be recorded as the number likely to be normally smoked at that time.

PRESENT PLACE IN OBSTETRICS FOR FOETAL PHONOCARDIOGRAPHY AND ELECTROCARDIOGRAPHY

WITH THE NEWER TECHNIQUES OF FOETAL ELECTROENCEPHALOGRAPHY AND MOVEMENT-RECORDING

BY

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Foetal heart rate, rhythm, and waveform can be studied by phonocardiography and electrocardiography from the maternal abdominal surface. The present value of these instrumental observations in relation to foetal welfare and clinical obstetric practice is reviewed and the basic design features of the instruments employed for the survey are given.

The subject is divided into : (1) conditions determining the choice between the two methods of foetal heart recording ; (2) recording techniques and description of the quantities measured ; (3) principal applications ; (4) details of apparatus ; (5) examples of typical recordings and their interpretation ; (6) other instrumental observations on the foetus ; and (7) discussion of foetal distress and its treatment.

Choice of Method

Phonocardiography is the most suitable method for recording heart rate and rhythm and for estimating the systolic and diastolic time intervals. It is always practicable when the heart is audible with a stethoscope ; it is impossible when the heart is inaudible to an experienced obstetrician or midwife listening in a quiet room. In some instances an active heart can be recorded when it has not been heard with certainty because of acoustic masking by uterine souffles, maternal heart sounds, or other foetal heart beats in a multiple pregnancy. In certain cases of severe foetal distress the heart sounds may be so uncharacteristic that they are not recognized as such, and then phonocardiography is helpful.

Electrocardiography has its field of usefulness when the heart cannot be heard. The technique is also possible, of course, in other cases, but it is then less convenient than using the phonocardiograph. Electrocardiography is possible in all patients from 16 weeks' gestation to term, with a few exceptions between 30 and 34 weeks, when some foetuses are totally covered with vernix caseosa, an electrical insulator (Wimmer, 1954).

Recording Techniques and Quantities Measured

Phonocardiography

The microphone must be firmly applied at the point on the abdomen where the heart can best be heard ; it may need to be repositioned if the foetus moves.

Phonocardiography is not unduly disturbed by extraneous noises, but is very severely affected by the mother's speech or movement and by intestinal disturbances. While the recording is in progress, therefore, the patient is asked to lie still and quiet.

In our particular studies we have used devices which register the intensity of the first and second heart sounds and their time relationships, and we have paid little attention to the acoustic quality of the sounds—that is, to the waveform. Many murmurs which are heard from the foetus disappear with the circulatory changes that occur at birth. The presence of high frequencies in the sounds depends not only on their production in the heart but also on the foetal position and the volume of surrounding maternal tissue and liquor amnii. Consequently, muffled sounds are not necessarily indicative of reduced cardiac output. Attempts to relate cardiac performance to sound levels must take account of relative movements between foetus and microphone, even for short-time changes in a particular patient. This we assumed to be too difficult, and limited our studies principally to time relationships. The measurement of systolic and diastolic times is of sufficient clinical value to justify phonocardiography in the labour ward, even if the more elaborate problems of sound analysis are omitted.

FIG. 1.—Foetal electrocardiograph in use.

Electrocardiography (Figs. 1 and 2)

The electrodes are formed by the two feet of a small metal box containing the pre-amplifier. These should rest firmly on the linea alba—for vertex presentations, one just above or below the umbilicus, and the other just above the pubic-hair line. A metal belt for the indifferent electrode is placed around the patient's waist between fundus and heart. Good contact is made under the belt and under the electrodes with "Cambridge" electrode jelly. The bladder should be empty. Other electrode positions are satisfactory but more influenced by maternal heart and muscle potentials.

Interference can be prevented when it arises from extraneous sources, but the recordings are disturbed by movements of the patient and by potential changes arising in organs other than the foetal heart. For this reason records of P and T waves are difficult to distinguish with certainty, but the QRS complex can be recorded faithfully in amplitude and duration. Maternal heart waveforms are usually also registered, but, since a maternal heart beat only occasionally coincides with a foetal one, the record is little impaired.

When clinical requirements necessitate a full foetal E.C.G. with P and T waves (for example, in cases of severe foetal distress or before caesarean section in a suspected cardiac abnormality), then intrauterine electrodes should be passed through the cervical canal, preferably after rupturing the membranes, and their positions, if necessary, ascertained by radiography.

Applications

The principal uses of phonocardiography are: (1) to monitor the foetal heart in a sleeping or overanxious patient ; (2) to check regularity of rhythm, and rate after version (success or failure), after surgical induction of labour, during oxytocin therapy, during the induction of anaesthesia, and during forceps application and traction ; and (3) diagnosis of foetal distress.

With the aid of phonocardiography the effects of administering oxygen, taking pressure off the presenting part, relaxing the uterus, pressing upon the placental site, and inducing regular uterine contractions with oxytocin (to improve the foetal circulation) can be followed speedily. Measurement of the systolic and diastolic times by recording both heart sounds enables a failing myocardium, or pulmonary stenosis, to be distinguished from impeded venous return, for the former lengthens the systolic time and the latter the diastolic time (Palmrich, 1951, 1952a, 1953).

Pressing the presenting part into the pelvis in patients with placenta praevia will slow the heart by lengthening

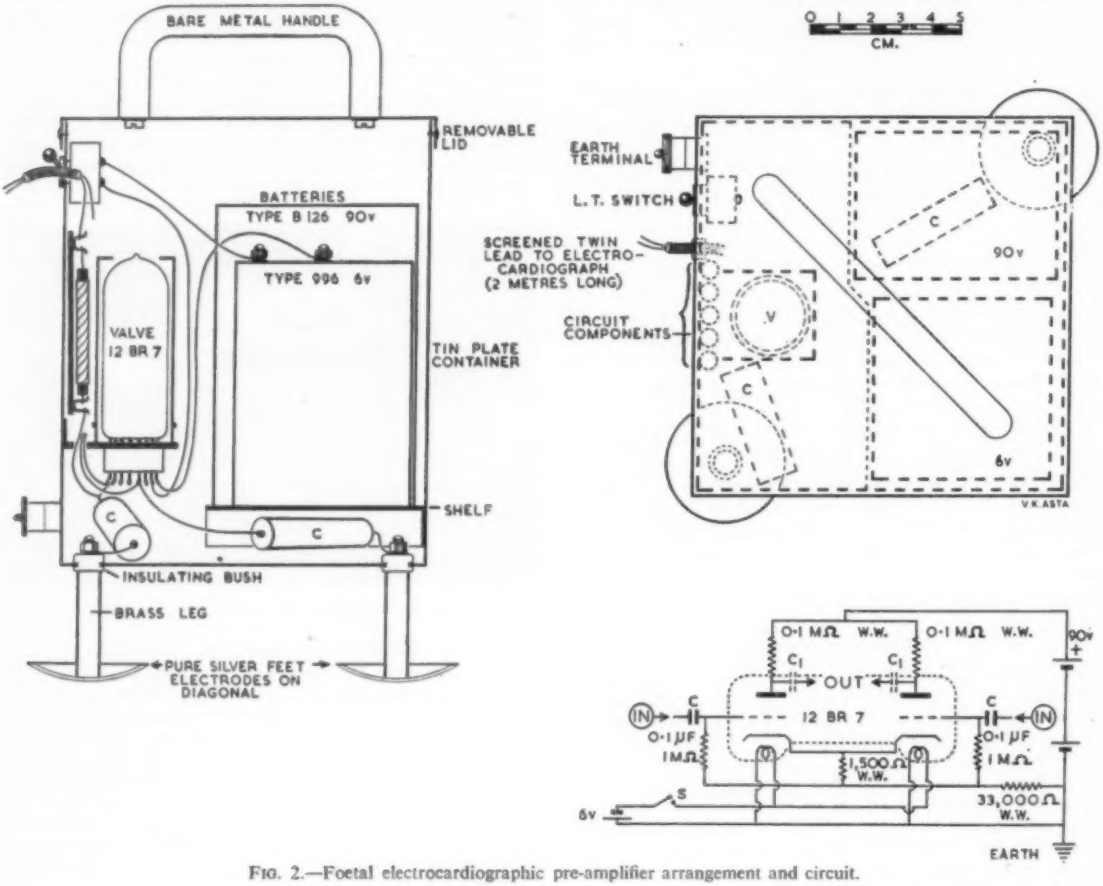

FIG. 2.—Foetal electrocardiographic pre-amplifier arrangement and circuit.

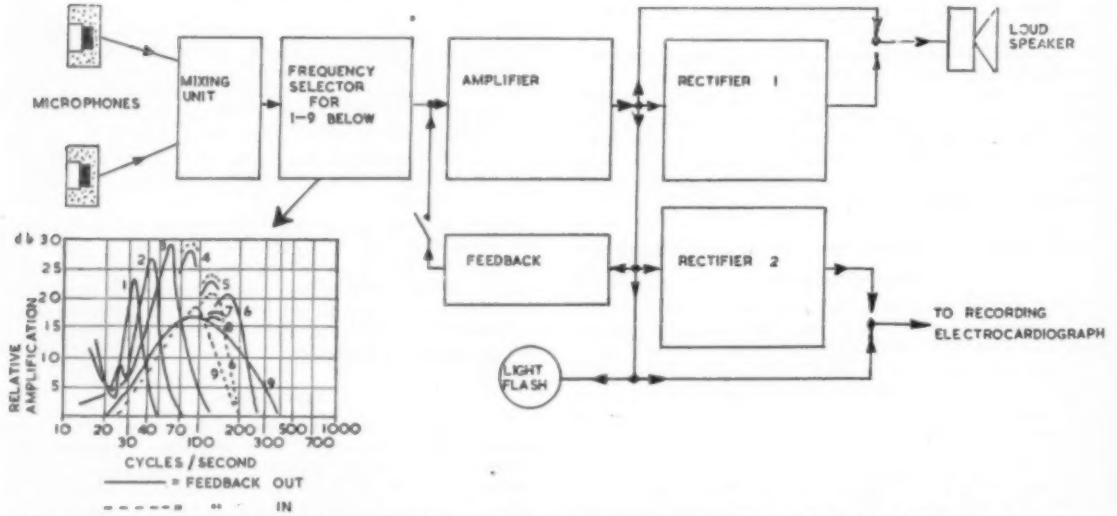

FIG. 3.—Circuit arrangement and frequency performance of phonocardiograph (Electrovac). Note rectifiers (1) to prevent acoustic instability and (2) to enable envelope of heart sounds to be recorded.

the diastolic time, but there is a reactionary tachycardia when pressure is released.

The volume of the heart sounds is reduced in foetal myocardial failure together with an increase of the systolic time. It is of doubtful value to judge foetal distress on the volume of sound alone, for, while reduction in sound is significant, the reliability of the measurement is affected critically by the position and firmness of the application of the microphone.

The principal uses of electrocardiography are: (1) the differential diagnosis of pregnancy and multiple pregnancy from other tumours (for example, a hydatidiform mole); (2) to give evidence of foetal life in cases of threatened abortion; (3) differentiation of breech from cephalic presentation; (4) recordings of rhythm and waveform will show evidence of certain cardiac abnormalities, myocardial failure, impeded circulation, and fibrillation—diagnosis of complete heart-block normally requires intrauterine electrodes; and (5) used in conjunction with phonocardiography, other diagnostic cardiological techniques become applicable to the foetus.

Details of Apparatus

Phonocardiography

This requires microphones, frequency-selective wave-filters, amplifiers, and loudspeakers or waveform-recording oscillographs (Steer and Hertsch, 1951; Gunn and Wood, 1953).

Microphones are chosen for (1) sensitivity in the lower frequency audible range; (2) freedom from response to extraneous noises, and (3) mechanical robustness. In our early experiments we tried piezo-electric, moving-coil, and condenser microphones because of the faithfulness of reproduction of the sounds. We finally decided, however, that moving-iron microphones were the most practical and had sufficient robustness and sensitivity. The ones employed resemble telephone earpieces, with the additional feature of adjustable magnet spacing. It seems preferable to space the microphone diaphragm away from the skin to avoid frictional noises, employing a sponge-rubber spacing annulus to avoid air leaks.

The wave-filters and amplifiers are frequency selective in the range 30 to 200 cycles per second. The loudspeaker, if used, has to be situated in a different room from the microphone to prevent "howling round" or acoustic instability. This can also be prevented by rectifying the sound-wave signals before they reach the speaker. This changes the true note into a sort of "plop" sound, and the loudspeaker can be left at the bedside.

The amplifier, wave-filter system, and acoustic stabilizing circuits which we use and have found most satisfactory are included in the equipment built by the firm Electrovac, of Vienna, in conjunction with Dr. A. H. Palmrich and Professor Antoine (Palmrich, 1952b). Fig. 3 shows the circuit arrangement and frequency response.

The Electrovac phonocardioscope can be connected to any recording electrocardiograph to produce a written record of the heart sounds to the upper frequency limit of the recorder; alternatively, the rectified sound intensity can be recorded irrespective of the frequency. This latter arrangement is particularly necessary for the measurement of systolic and diastolic time intervals (Fig. 4).

Electrocardiography

The apparatus used at present is similar to that described previously (Bell, 1938; Smyth, 1953), with mechanical changes for convenience and increased portability.

The present instrument comprises a Cossor electrocardiograph and a pre-amplifier. The pre-amplifier is in a small metal box with two legs, which form the electrodes. In Fig. 1 it can be seen held to the mother's abdominal surface; its design is shown in the scale drawing of Fig. 2.

Switches were added to the electrocardiograph to enable the time-constant to be reduced to 0.1 or 0.02 second from 2 seconds. This avoids long-term blocking of the amplifiers when interfering signals arrive unexpectedly. Reducing the time-constant gives some improvement in the signal-to-noise ratio, but it also gives an increase in waveform distortion.

Most electrocardiographs contain direct-current blocking condensers in the input circuit. Where these are not present condensers must be included between the pre-amplifier and the electrocardiograph; they are shown dotted (C_1) in Fig. 2, and can be housed within the pre-amplifier case. Values between 0.1 and 0.02 microfarad are suitable, depending on the time-constant required.

Reduction in time-constant results in some reduction of the P and T waves in relation to the QRS complex, but, since P and T waves cannot be recorded regularly above the background of other bio-electric potentials, the loss is seldom consequential, and the long time-constant circuit can be restored by switching when desired. Southern (1954) has described the recording of P and T waves and their diagnostic importance, but he gives no details of the apparatus, and does not state how they are consistently to be distinguished from artifacts. We do not wish to detract from the importance of recording P and T waves, if such recordings are technically possible. We have not found them reliable.

Typical Recordings

Phonocardiography

Severe Foetal Distress in Labour.—Fig. 5 was taken immediately after a low artificial rupture of the membranes had been performed to induce labour. The heart became progressively slower and more irregular, both the systolic and diastolic time intervals were increased, there was only a slight improvement with oxygen therapy, and the baby

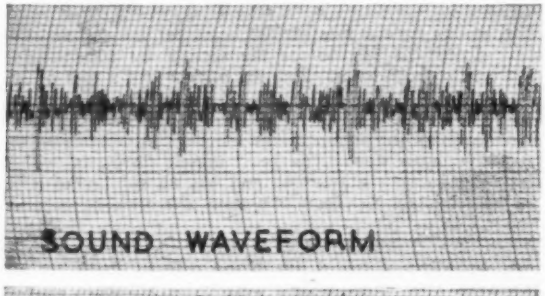

FIG. 4.—Phonocardiogram. A=First heart sound. B=Second heart sound. S=Systolic time. D=Diastolic time.

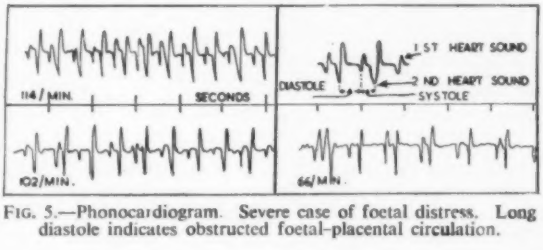

FIG. 5.—Phonocardiogram. Severe case of foetal distress. Long diastole indicates obstructed foetal-placental circulation.

was delivered by caesarean section about an hour later. Unfortunately it was too severely injured by "intra-partum asphyxial changes" to survive for more than an hour. Occasional cases such as this illustrate that electrical diagnostic measures need to be backed up by quick decisions and prompt surgical service.

Foetal Distress in Pregnancy.—In one case irregularities of the foetal heart were recorded three weeks before the expected date of delivery. Braxton Hicks contractions and manual pressure on the abdominal surface produced marked slowing of the foetal heart. The QRS complex and the systolic times were normal, but the long diastolic times showed some impediment to foetal venous return. The effect was intermittent. The patient was advised to avoid tight clothes or pressure on the abdomen, and a frequent watch was kept on the heart until labour began at term. On delivery the cord was found to be twisted around the leg and compressed each time the knee was flexed.

Slowing of Heart Rate During Contractions.—In an example in early labour the heart was slowed by an increase in diastolic time only, demonstrating impaired venous return (Fig. 6).

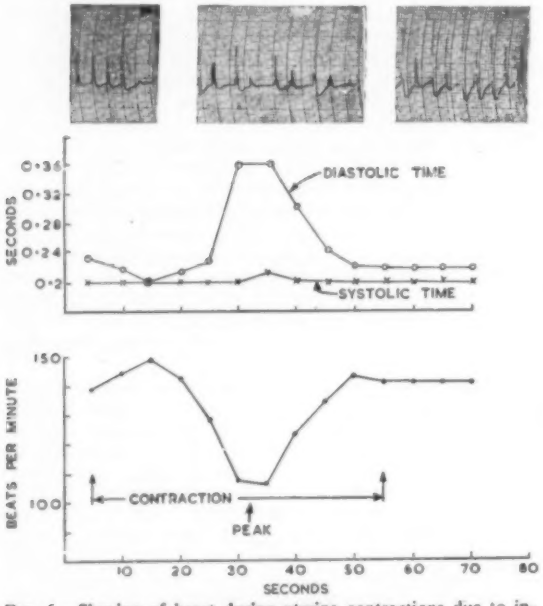

Fig. 6.—Slowing of heart during uterine contractions due to increase in diastolic time; impaired foetal venous return.

Electrocardiography

Forceps Delivery.—Fig. 7 shows changes in the foetal heart rate during forceps extraction. Such recordings can be used at the time to warn the surgeon of the effects on the foetus of the application of the forceps and traction.

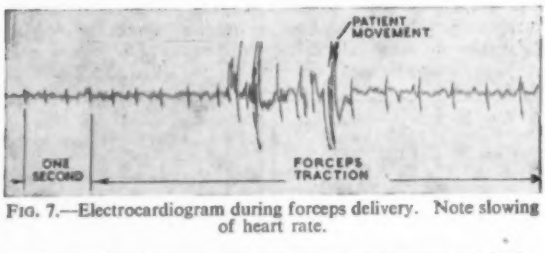

Fig. 7.—Electrocardiogram during forceps delivery. Note slowing of heart rate.

Diagnosis of Twins.—This was a suspected case of hydatidiform mole (18 weeks' gestation). The E.C.G. (Fig. 8A), however, gave a clear recording for twins, which were, in fact, aborted a week later.

Threatened Abortion.—Difficulty had been found in hearing the foetal heart with a stethoscope at 20 weeks' gestation. The E.C.G. (Fig. 8B) confirmed foetal life; the heart rate is within the normal range.

Moribund Foetus.—We have had cases in which the foetal heart was heard feebly until 15 minutes before delivery and then the foetus was born with slight signs of maceration. Fig. 9 is an example of a foetal E.C.G. taken three days after the heart was last heard. On delivery by caesarean section one hour after the recording, the foetus was severely macerated, but the heart tissue was still normal. Clearly, the E.C.G. must not be accepted as evidence of foetal viability if the heart cannot be heard when, by reason of the length of gestation, it should be audible with a stethoscope. It is only fair to point out, however, that all cases in which this phenomenon has been observed have had a very abnormal heart rate—that is, above 300 beats per minute. The case recorded in Fig. 9 had at one time a rate of 700 beats per minute, and this was slowed to 350 before the section by administering digoxin to the mother. Another patient had a rate of 300 beats per minute. Presumably, in such extreme cases the heart is maintained in fibrillation nourished by blood circulated by the action of the uterine contractions on the placental–heart flow. The heart muscle fibrillates, with a high-speed circus movement, and has no substantial effect on the circulation. There is a state of morbid hypotension leading to peripheral maceration. N. J. Brown (1957, personal communication) states that in macerated foetuses he has occasionally found live blood cells in the heart and placenta when other organs were in an advanced state of decomposition.

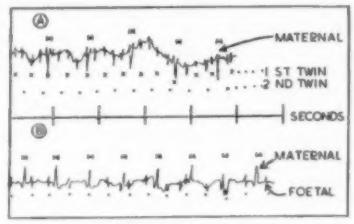

Fig. 8.—Electrocardiographs (electrodes on maternal abdomen) demonstrate foetal life. (A) Twin pregnancy in case of suspected hydatidiform mole, 18 weeks' gestation. (B) Case of threatened abortion at 20 weeks' gestation.

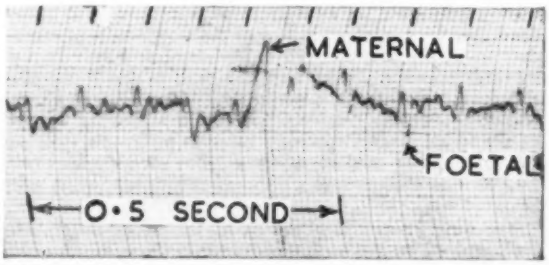

Fig. 9.—Foetal electrocardiogram three days after heart became inaudible and one hour before delivery of a severely macerated foetus.

After Termination of Pregnancy by Hysterotomy.—In two cases the entire conceptus was put into normal saline immediately after removal and the E.C.G. recorded until the foetus died. One was allowed to cool, while the other was oxygenated and maintained at constant temperature. Both cooling and oxygen lack reduced the heart rates.

Other Instrumental Observations on the Foetus

Recording of Foetal Movement

During the recordings of uterine contractions by abdominal tocodynamometry the slowly changing curve of uterine action is often disturbed by kicks and bodily foetal

movements causing sharp changes of pressure. Whether the foetus is attempting reflexly to remove the tocodynamometer, to jerk its way to a different presentation, or just exhibiting *joie-de-vivre*, is not clear, but the frequency of movements varies from perhaps 30 in half an hour to none at all. Some foetuses respond to finger pressure or flicks on the abdominal surface by kicking or moving, while others appear oblivious.

These findings have not been related to the condition of the baby at birth, but various theories concerning the possible loss of consciousness of the foetus during labour have been advanced; principally anoxia, analgesics, or compressive forces are blamed. Here we draw attention to the possible value of this investigation as a means of anticipating neonatal asphyxia, or the need for additional care in searching for an unexpected onset of foetal distress.

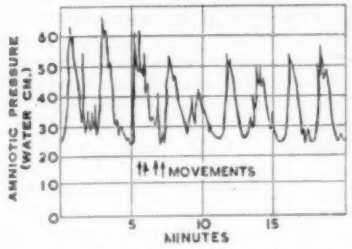

FIG. 10.—Recording of contractions showing foetal movements superimposed.

Fig. 10 is an example of a tracing of uterine action during labour, which shows how readily foetal movements are recorded.

Foetal Electroencephalography

During foetal electrocardiography employing abdominal electrodes various potential variations are recorded in addition to those expected to arise from the heart. These are due to activity in the maternal bladder and other visceral organs, to arterial pulsation synchronous with the maternal heart and, it is thought, to the foetal brain. With vaginal electrodes there is an increase in the non-cardiac waveforms, and the recordings in some respects are not unlike electroencephalograms.

To investigate this, a portable two-channel Ediswan recorder (having a time-constant of 1 second) was borrowed. A few recordings were done, of which Fig. 11 is an example,

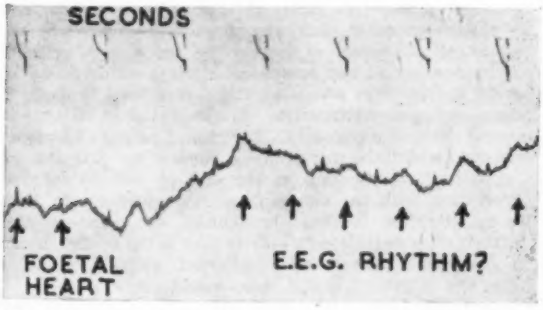

FIG. 11.—Presumed foetal electroencephalogram taken with intravaginal electrodes.

using pure silver, chlorided vaginal electrodes placed in the fornices. These recordings have been variously interpreted by experts in this country and France as 100% artifacts, doubtful, and undoubted evidence of gross anoxia. The subject has received more attention from Bernstine and Borkowski (1955, 1956).

Until the interpretation of the electroencephalogram of the newborn is well documented in relation to anoxia, head moulding, maturity, foetal movements *in utero*, and other factors, work on the foetus must be limited to improvements in technique and the collection of data for research analysis.

Foetal Distress

Clinical opinion holds that if an irregular heart improves with oxygen therapy prompt delivery is desirable, even necessary, because this is a sign of impaired oxygen transfer following placental separation or damage, and is unlikely to be relieved by relaxing pressure on the cord or placenta. This is a good working rule, but pressure on the cord or placenta can slow the heart, and, so long as the systolic time and the duration of the QRS complex remain normal, relaxation of uterine tone or repositioning of the foetus may relieve the distress; if the distress is severe, as in the case illustrated in Fig. 5, there is little time for these manœuvres. If, however, the distress is slight and the uterine contractions are less frequent than one every five minutes, a weak oxytocin infusion will start a regular uterine rhythm, reduce the tone, and, by improving placental–foetal circulation, may relieve the foetal distress.

It would appear very probable that the first sign of anoxia is acceleration of the foetal heart, which can be slowed with oxygen; later there may be a dramatic slowing of the heart, and in such cases oxygen therapy will accelerate it. The first sign of impaired circulation caused by compression of the cord or placenta is undoubtedly a slowing of the foetal heart. Infection or pyrexia must also be considered as possible causes of a fast foetal heart. Hence the factors underlying a heart of abnormal rate need instrumental diagnostic tests. Thick meconium is an adverse prognostic sign, and its presence or absence ought to be determined in every case of foetal distress. For cases showing intermittent foetal heart irregularities, with slight distress, at the end of pregnancy, immediate delivery is not necessary. Such conditions, however, may suddenly become worse or better, and frequent monitoring of the heart is desirable, especially when the membranes rupture or labour begins.

Summary

Techniques for foetal phonocardiography, electrocardiography, electroencephalography, and movement-recording are described.

The fields of usefulness of the two methods of cardiography are defined, and the possible value of foetal electroencephalography and movement recording is discussed briefly.

Typical recordings are reproduced and discussed.

Observations on moribund foetuses increase our understanding of one manner of foetal death, and emphasize the danger of regarding the foetal electrocardiogram as conclusive evidence of foetal viability.

The differential diagnosis of foetal myocardial failure from impaired foetal venous return in cases of foetal distress is demonstrated.

Acknowledgments for financial assistance in this work are gratefully rendered to the Board of Governors of University College Hospital, to the Trustees of the Rockefeller Fund of University College Hospital Medical School, and to the Nuffield Foundation, who have supported this work in the years 1950 to 1958. Thanks are also due to Professor W. C. W. Nixon, who organized and encouraged the programme, and to the staff and students of the obstetric unit who have helped with the recordings and called our attention to cases suitable for studying the usefulness and limitations of these recording techniques.

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ADULT CHRONIC BRONCHITIS—CONTINUOUS ANTIBIOTIC THERAPY

BY

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The use of the broad-spectrum antibiotic in the treatment of chronic bronchitis has occasioned considerable interest in the recent past (*Lancet*, 1955; *B.M.J.*, 1957). Several trials employing drugs of this kind in the management of chronic or recurrent pulmonary infection have been carried out to determine the results which immediately follow such a prolonged course of treatment (Helm *et al.*, 1954, 1956; May and Oswald, 1956; Moyes and Kershaw, 1957). We have also reported our experience in such a controlled trial employing a double-blind technique using oxytetracycline (Edwards *et al.*, 1957). The antibiotic was used alone, or in combination with other agents, in the domiciliary management of patients with chronic bronchitis, and was given continuously during six winter months in 1955–6. We here describe the further progress of these patients to show the duration of the benefit which followed such a course of treatment, and to determine the frequency with which these courses require to be repeated.

In the original oxytetracycline trial, 66 patients were allotted to various treatment schedules by random selection, and of these 53 completed the six-months course of treatment. In the oxytetracycline series of 29 patients, 21 were improved and 8 showed no improvement. In the control group of 24 patients who completed the course of treatment, 7 were improved and 17 showed no real change. This represents a significant degree of improvement in the oxytetracycline-treated group as compared with the control series. In order to assess the fate of these patients, follow-up studies for a further period of 12 months were carried out on the 29 oxytetracycline-treated patients (Series 1) and 13 selected patients of the 24 controls (Series 2).

Further Follow-up

Series 1

Of the 29 oxytetracycline-treated patients who were to be followed up, those alternately numbered on the Trial Register continued therapy with oxytetracycline with or without a sulphonamide as in the first trial. The other alternate patients were now treated with blank control material exactly similar in appearance to the active substances which they had previously received. Thus the 29 patients were divided into group A and group B. Group A consisted of 14 patients who continued with the antibacterial substances for a total of 18 months' continuous therapy. Group B consisted of 15 patients who, after the initial six months' oxytetracycline treatment, continued under observation as controls on blank material for a further 12 months. When patients relapsed they were removed from the trial so that other antibiotic therapy could be given as required. All the patients followed up were seen monthly for review and assessment in accordance with the method we have described elsewhere.

The results of the assessments at the end of each six-monthly review period are shown in Table I. Each assessment refers to the patient's condition at the end of the review period compared with that obtaining at the start of that period. No patient in group A on continuous therapy was known to have relapsed during any of the observation periods lasting through two winters and one summer from November, 1955, to April, 1957, and some patients even continued to improve during each observation period. In Group B, after six months' active therapy during the first winter followed by dummy control therapy for a further year, 7 patients relapsed during the period April to November, 1956, and another 4 relapsed in the succeeding winter. During the total period of follow-up, three patients were lost to the trial—namely, two who defaulted in the second six months of observation, although both were known to be well, and one who died from so-called "heart failure," no other information being available. These patients were all in group A, and have been shown as "exclusions." Comparison of the patients' conditions at the end of 18 months' observation with their condition at first entry into the trial in November, 1955, shows that all of the 11 remaining in group A on continuous therapy were improved, while there were no known relapses. In group B only 2 out of 15 patients were improved after 18 months' observation, but 11 had relapsed.

Series 2

From the 24 patients in the control group of the original trial who completed the first six months' observation, 13 had previously been selected for continued observation for another purpose. These 13 patients, who comprise Series 2, were treated continuously for a second period of six months from April to November, 1956, with the various agents (excluding oxytetracycline) used in the original investigation. On the anniversary of their entry into the trial, 6 of these patients chosen at random were given in addition oxytetracycline (group C), whilst the other 7 (group D) continued treatment as before. Apart from this change, groups C and D were comparable. These two groups were then observed for a further period of six months from November, 1956, to April, 1957.

Both groups had reacted in a similar fashion by the end of the first 12 months of observation. When the condition of these patients was assessed at the end of the second six-months review period and compared with the condition at the end of the original trial (Table II), 3 of the 6 in group C, and 3 of the 7 in group D, had relapsed, whilst none in either group showed any improvement. When the assessment was made at the end of the third six-months observation period and compared with the condition at the end of the previous review, 4 of the 6 patients in group C now receiving oxytetracycline were improved and 2 showed no real change. In group D, however, 3 patients had again relapsed, whilst the remaining 4 showed no real change. Comparing the situation at the end of this 18 months' observation with the condition at first entry to the trial, the relapse rate in those bronchitics not receiving oxytetracycline is considerably greater than in the treated group. In group C 4 patients were improved, whilst in group D none was improved and 4 were worse.

Time of Relapse

No patient in group A was known to have relapsed, but three patients have been excluded from further follow-up for reasons already stated. Of the 7 patients in group B who relapsed in the period April–November, 1956, one relapsed one month after stopping treatment, 4 after five months in September, and two in October, 1956, in the sixth month of the period. Of the 4 relapses in the next six months two occurred in November and one each in December and January. In group C 3 patients relapsed in the period April to November, 1956—one in August and the other two in October. Similarly, of the 3 relapses in group D, one also took place in August and two in October. Of the 3 further relapses in group D in the succeeding period,

one occurred in December and two in the following January. No patient in group C relapsed in the final six-months observation period while receiving oxytetracycline.

The time relationship of the total relapses in all of the groups is shown in Table III, where the exclusion of three patients from group A has been assumed to be due to relapses. This accounts for a loss or possible relapse rate of about 20%. In group B no relapses occurred whilst the patients were treated with oxytetracycline, but within six months of stopping the antibiotic about half of them had relapsed. Of those who remained under further observation, another 50% relapsed during the last half-yearly review period, making a total relapse rate of about 75% during the whole period of 18 months' observation. Of those patients treated without oxytetracycline (groups C and D), about one-third relapsed during the first six months' observation, whilst about a half relapsed in the second six months' review period. The group C patients were then treated with oxytetracycline, and the relapse rate was reduced to zero, whilst in group D, whose treatment continued without oxytetracycline, a relapse rate of about 50% was maintained.

Over the whole 18-months period the relapse rate in group A appeared to be nil, although it is possible it may have been in the order of 20%; in group B it was 73%; in group C 83%, and in group D, after 18 months' observation without antibiotic therapy, all patients had suffered one or more severe exacerbations, producing a summated relapse rate of 114%.

Discussion

It has been shown that continuous oxytetracycline therapy throughout the six winter months produces statistically significant improvement in chronic bronchitis during the period of its use (Edwards *et al.*, 1957), and when given continuously for 12 to 18 months the improvement rate apparently

TABLE I.—*The Results in Series 1 at End of Each Six-monthly Period as Compared with the Condition at End of Previous Period, and at End of 18 Months' Observation as Compared with the Start*

Series 1 Treatment Groups	No. of Patients	Assessment Gradings	Assessment at End of Each 6 Months' Observation Period as Compared with Assessment at End of Previous Period			Assessment at April, 1957, as Compared with Condition at First Entry in Nov., 1955
			First Period: Nov., 1955, to April, 1956	Second Period: April, 1956, to Nov., 1956	Third Period: Nov., 1956, to April, 1957	
Group A: 18 months' continuous oxytetracycline therapy from Nov., 1955, to April, 1957	14	Improved	11	2	5	11
		No change	3	9	6	—
		Relapsed or worse	—	—	—	—
		Exclusions	—	3	—	3
Group B: 6 months' oxytetracycline therapy (Nov., 1955–April, 1956), followed by 12 months' blank control therapy (April, 1956–April, 1957)	15	Improved	10	—	—	2
		No change	5	8	4	2
		Relapsed or worse	—	7	4	11
		Exclusions	—	—	—	—

Note: All patients marked "Exclusion" or "Relapsed or Worse" are excluded from the subsequent assessments.

TABLE II.—*Results in Series 2 at End of Each Six-monthly Period as Compared with Condition at End of Previous Period, and at End of 18 Months' Observation as Compared with the Start*

Series 2 Treatment Groups	No. of Patients	Assessment Gradings	Assessment at End of Each 6 Months' Observation Period as Compared to Assessment at End of Previous Period			Assessment at April, 1957, as Compared with Condition at First Entry in Nov., 1955
			First Period: Nov., 1955, to April, 1956	Second Period: April, 1956, to Nov., 1956	Third Period: Nov., 1956, to April, 1957	
Group C: 12 months' continuous control therapy (Nov., 1955–Nov., 1956) followed by 6 months oxytetracycline (Nov., 1956, to April, 1957)	6	Improved	1	—	4	4
		No change	3	3	2	2
		Relapsed or worse	2	3	—	—
		Exclusions	—	—	—	—
Group D: 18 months' continuous control therapy without oxytetracycline from Nov., 1955, to April, 1957	7	Improved	2	—	—	—
		No change	3	4	4	3
		Relapsed or worse	2	3	3	4
		Exclusions	—	—	—	—

TABLE III.—*Showing Frequency and Periodicity of Bronchitis Relapses in Series 1 and 2*

Observation Period	Series 1. Group A				Series 1. Group B				Series 2. Group C				Series 2. Group D			
	Nos. at Risk	Drug Regime	Nos. Relapsed	%	Nos. at Risk	Drug Regime	Nos. Relapsed	%	Nos. at Risk	Drug Regime	Nos. Relapsed	%	Nos. at Risk	Drug Regime	Nos. Relapsed	%
Nov., '55–April, '56	14	T	Nil	0%	15	T	Nil	0%	6	C	2	33%	7	C	2	29%
May, '56	14	T	2*	—	15	C	1	—	6	C	Nil	—	7	C	Nil	—
Aug., '56	12	T	Nil	—	14	C	—	—	6	C	1	—	7	C	1	—
Sept., '56	12	T	1*	—	14	C	4	—	6	C	Nil	—	7	C	Nil	—
Oct., '56	11	T	Nil	—	10	C	2	—	6	C	2	—	7	C	2	—
April, '56–Nov., '56	14	T	3*	21%	15	C	7	47%	6	C	3	50%	7	C	3	43%
Nov., '56	11	T	Nil	—	8	C	2	—	6	T	Nil	—	7	C	Nil	—
Dec., '56	11	T	Nil	—	6	C	1	—	6	T	Nil	—	7	C	1	—
Jan., '57	11	T	Nil	—	5	C	1	—	6	T	Nil	—	7	C	2	—
April, '57	11	T	Nil	—	4	C	Nil	—	6	T	Nil	—	7	C	Nil	—
Nov., '56–April, '57	11	T	Nil	0%	8	C	4	50%	6	T	Nil	0%	7	C	3	43%
April, '56–April, '57	14	T	3*	21%	15	C	11	73%	6	C & T	3	50%	7	C	6	86%
Nov., '55–April, '57	14	T	3*	21%	15	T & C	11	73%	6	C & T	5	83%	7	C	8	114%

*=Exclusions. T=Treatment with oxytetracycline. C=Treatment excluding oxytetracycline.

increases. Conversely, continuous drug therapy prevents relapse in bronchitis, and the longer the duration of therapy the more effective the preventive measure against relapse appears to be. It would seem that relapse in chronic bronchitis during the summer and autumn months is considerably reduced, if not entirely prevented, by continuous antibiotic therapy. Without such continued treatment about half of the bronchitics during a six-monthly review period may be expected to relapse, and this seems to occur irrespective of whether antibiotics were used continuously in the previous season or not. Once a severe exacerbation occurs, many bronchitics are often appreciably disabled for a long period unless the relapse is intensively treated with antibiotics. These appear to be adequately suppressive in controlling the effects of bronchial infection.

The suppressive action of oxytetracycline is apparently effective only during the period of its administration, and does not seem to prevent or even delay the appearance of relapse following its withdrawal. The relapse rates during six winter months from November to April in patients treated without antibiotics are but little different from those occurring in the months from April to November. However, 80% of all relapses observed in the four treatment groups appeared between September and February. This may well be related to the climatic and atmospheric changes associated with the onset of autumn, particularly in highly industrialized communities.

It would thus seem reasonable to initiate a six-months course of continuous broad-spectrum antibiotic therapy when the first significant relapse occurs. Since most of these relapses occur in the autumn and winter, such a course of treatment may well overcome the relapse itself and also prevent further deterioration during the winter months, when most bronchitics are mainly at risk. Also it may be anticipated that no further continuous antibiotic therapy may be required for about six months after completing this course of treatment. It would therefore seem that only one period of continuous prolonged treatment with oxytetracycline in a dosage of 0.5–1 g. daily for about six months—the actual duration depending on the time of starting the treatment—may be required to prevent incapacitating exacerbations and maintain many bronchitics in effective and useful employment throughout the whole year.

Comment has already been made concerning the expense of prolonged therapy with the tetracycline group of drugs for a period of six months. If a course of antibiotic treatment is started at the time of the first major relapse and continued for six to seven months, as may be required, the total cost to the National Health Service would be about £45–£55, and would be occasioned but once in each year. The arguments already adduced for suggesting that such a course of treatment with a seemingly expensive drug may in fact be an economy when other aspects of national expenditure—such as National Insurance benefit, the cost of a hospital bed, etc.—are considered, now have added significance.

No untoward difficulties or complications occurred in those patients on prolonged antibiotics; toxicity was minimal, significant drug resistance was not observed, and the development of bronchial or intestinal oxytetracycline-resistant coagulase-positive staphylococci and of monilia did not materially differ in any of the treated or control groups.

Summary

The results of an 18-months follow-up of 42 patients with chronic bronchitis, when treated with or without oxytetracycline for periods of varying duration, are presented.

Continuous and prolonged antibiotic therapy for one year or more not only prevents relapse in chronic bronchitis but increases the rate of improvement the longer the therapy is maintained.

Acute exacerbations of chronic bronchitis assume major proportions during the autumn and winter, particularly between September and February, when 80% of relapses tend to occur.

It is suggested that continuous therapy with oxytetracycline for one period of about six months in each year, to include the period of maximum relapse, may prevent exacerbations and maintain most bronchitics in effective and useful employment.

We acknowledge with thanks the considerable clinical assistance in the management and review of these patients we have received from Dr. A. R. Buckley, late senior registrar to the Leeds Chest Clinic. We are also grateful to Dr. G. B. Ludlam, of the Public Health Laboratory Service, and to Dr. H. T. Levi, of St. James's Hospital, Leeds, for the routine laboratory investigations they carried out. We are indebted to Messrs. May and Baker, Ltd., and Messrs. Pfizer, Ltd., for the generous supplies of "sulphatriad" and "terramycin SF" respectively, and the appropriate dummy controls. Part of the expenses involved in this work were defrayed by a grant from a Joint Research Fund administered by the British Tuberculosis Association in conjunction with the Association of Industrial Medical Officers.

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CARBON DIOXIDE POISONING

REPORT OF EIGHT CASES, WITH TWO DEATHS

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Although rarely reported, carbon dioxide poisoning is probably not so infrequent an occurrence. McNally (1937) states that it is one of the most commonly occurring of all gases, and is often the cause of death of persons entering caves, wells, and other low-lying or confined spaces. Smith and Cook (1948), on the other hand, state that death from carbon dioxide poisoning is very rare, and that cases so reported are nearly always due to other gases, such as carbon disulphide.

Deaths due to carbon dioxide poisoning are included in the rubric E894 of the *International Classification of Diseases, Injuries, and Causes of Death*, "Accidental Poisoning by Other Specified Gases and Vapours," and in 1955 17 males and one female died from this cause in England and Wales. These figures include deaths due to gases other than carbon dioxide, and it is not known how many of them were caused by carbon dioxide poisoning.

The following cases are reported to illustrate the occurrence of carbon dioxide poisoning as a hazard in the handling of ships' cargoes.

Early in March, 1956, a liner arrived at Penang with a cargo of onions. The particular hold had been loaded six days previously, and contained 5,000 bags of onions and a quantity of "jaggery" (a crude brown sugar obtained from the sap of palm trees). It was full to within 9 ft. (2.7 m.) of the deck. At about 1 p.m. the ship was boarded by labourers, who removed the hatch covers and opened the hatch. One entered the hold and collapsed as he was standing on the onions. Another went in to help him and also collapsed. Then the ship's doctor was sent for; he went

into the hold, followed by one of the ship's officers, and assisted him to lift the unconscious man who had first entered the hold. As he was doing so the doctor collapsed, and the ship's officer carried the man out. One of the ship's crew then went into the hold to assist, but he collapsed. Another ship's officer then entered with breathing apparatus, and brought out the doctor and the other unconscious men. The four men who had collapsed were then taken to hospital, where it was found that two of them were dead.

Four other labourers who had also entered the hold for short periods developed minor symptoms and were taken to hospital.

Estimates of the length of time that the men were lying in the hold varied considerably, but it seems that the doctor was lying there unconscious for about five minutes, and the others for variable periods up to about 15 minutes.

The first patient was admitted to hospital about an hour and a quarter after he had gone into the hold. On admission he was deeply comatose and having continuous convulsions. Breathing was stertorous, the pupils were non-reactive, the conjunctivae were injected, but there was no cyanosis. The pulse rate was 156 a minute, and the blood pressure 160/100 mm. Hg. He was immediately given continuous oxygen, and an injection of nikethamide was administered and, after about an hour, paraldehyde by injection to control the convulsions.

Spasms passed off after two hours, and the patient recovered consciousness about seven hours after admission. He was able to get up two days later, but complained of giddiness, which passed off after three days. He was discharged eight days after admission. Spectroscopic examination of his blood the day after admission showed no abnormal pigment.

The doctor was admitted about one and a half hours after he entered the hold. He was conscious on admission, but gave a history of loss of consciousness for about half an hour. He complained of headache and aching in the joints. The pulse rate was 100 and the blood pressure 114/80 mm. Hg. The conjunctivae were injected, but there was no cyanosis. He recovered rapidly and was discharged four days later.

The remaining four patients were admitted later in the day. They all stated that when they entered the hold they became giddy, and three of them complained also of pains in the legs and of pain and dryness of the throat. Only one showed any injection of the conjunctivae, and none showed cyanosis. They were all discharged after one or two days.

Post-mortem Examinations.—The bodies of the two men who died were brought to the mortuary and kept in the cold overnight. At the urgent request of the relatives, only an external examination was performed. Neither body had any sign of injury, but both showed marked injection of the conjunctivae, and cyanosis of the finger- and toe-nail beds and of the buccal mucosa. Death was certified as being due to carbon dioxide poisoning.

Analysis

An analysis of the gases present in the hold was carried out by the senior chemist about an hour and a half after the hold had been opened. He obtained an appreciable reaction for carbon dioxide in the hold, particularly beneath the deck; and on examining other holds in the ship, as yet unopened, he obtained a strong reaction. No other poisonous gases were detected. For three months following this accident, the department of chemistry carried out inspection on all ships carrying onions for unloading at Penang. Nineteen ships were inspected, and carbon dioxide was found in significant amounts in one instance, in which it appeared that the onions had come from the same source as those held responsible for the incident.

Later, experiments were carried out, using onions from the ship, and it was found that the atmosphere in a sealed flask containing ¼ v/v of onions contained over 30% carbon dioxide after five days. It was not possible to give an accurate estimate of the quantity of carbon dioxide present in the hold, as a good deal had been dispersed by the time tests were made.

Discussion

The toxic action of carbon dioxide is twofold. By dilution of the air it reduces the oxygen tension, thus acting as a simple asphyxiant, and it also has a chemical action as a respiratory stimulant and narcotic. There is, however, a great deal of difference of opinion over what concentration of carbon dioxide will be fatal. Jacobs (1941) states that 25% of carbon dioxide is required for several hours to produce death, and cites an incident in Brooklyn in 1936 when several workers were asphyxiated in the hold of a ship in which solid carbon dioxide was used as a refrigerant. Owen (1935) gives a concentration of 10% as sufficient, or even 5% if the oxygen tension is lowered, but makes no mention of the time of exposure before death occurs. He describes an incident in which 13 men were poisoned in the hold of a ship which contained bags of grain of various sorts. Elkins (1950) mentions 10% as an intolerable concentration, and states that at higher levels coma and death result. He suggests that carbon dioxide acts primarily as a narcotic at very high concentrations. Peterson *et al.* (1923) give figures similar to those of Elkins.

Anselmo *et al.* (1951) describe an incident in which five persons were overcome with carbon dioxide in a well 4.75 metres deep. Two died, but in these cases carbon dioxide was not the immediate or the only cause of death. Analysis of the air in the well later showed a concentration of 12.5% carbon dioxide and 10.5% oxygen at a level of 1 metre above the surface of the water. In this case it is clear that the decreased oxygen tension would have some effect.

Although it was not possible to give any figure of the concentration of the carbon dioxide present in the hold in the incident described, it seems likely, from the rapidity of onset of unconsciousness and the speed with which death followed in the two cases, that the concentration of carbon dioxide must have been in the region of 25–30%, and this figure is supported by the subsequent experiments. Indeed, it is possible that at the lower levels, only a foot or so above the cargo, the concentration may have been somewhat higher, owing to the density of carbon dioxide in relation to the atmosphere. Elkins (1950) states that in order to reduce the oxygen tension to a fatal degree the vapour content must be about 50%. It is possible that the concentration of carbon dioxide at lower levels may have been of this order.

The symptoms displayed by these men accord well with descriptions given elsewhere. Owens describes symptoms of headache, giddiness, tinnitus, and loss of muscular power. He suggests that carbon dioxide has primarily a narcotic action, and mentions convulsions as being sometimes present. The symptoms described by Smith and Cook (1948) are similar; and the cases described by Anselmo *et al.* (1951) also gave symptoms of mental excitement and later giddiness, weakness, and headache.

The doctor subsequently described his experiences, and said that when he entered the hold he was aware that the atmosphere seemed to make breathing difficult, and that there was a fairly pungent smell. He had no pain or any warning signs, but became unconscious very rapidly.

Summary

An incident is described in which eight persons were poisoned by carbon dioxide. The mode of action of carbon dioxide as a poison, its rate of action, and the symptoms are discussed.

My thanks are due to Dr. R. A. Pallister, senior physician, General Hospital, Penang, for clinical details of the patients; to Mr. S. A. Baron, senior chemist, Penang, for details of the

investigations carried out by the department of chemistry; and to H.M. Coroner, Penang, for permission to see the report on the inquest.

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TRIAL OF DEQUALINIUM FOR SKIN INFECTIONS

BY

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Despite the many preparations now available for the treatment of infective skin conditions, none are universally acceptable. The older agents, particularly the heavy metals, will occasionally irritate or cause sensitization, and the dyes—though effective and still widely used—are cosmetically unattractive. Sulphonamides and penicillin, used locally on the skin, are particularly apt to sensitize, and on this account are avoided by dermatologists.

Although the modern polyvalent or "wide-spectrum" antibiotics are very efficient and rarely irritant, their dangerous influence on the adaptable staphylococcus raises new problems. The skin infections may be improved at the price of increasing the cadre of existing staphylococci and of subjecting the patient to a subsequent, and more serious, attack by the resistant strain thus created.

Antibiotics that are not generally used parenterally—such as neomycin, framycetin, tyrothricin—have been preferred for local applications. Even so, resistant strains are already developing to some of these and may well become more prevalent. This potential danger of outrunning the future supply of antibiotics suitable for skin treatment, and to which the staphylococcus remains sensitive, justifies the search for suitable alternatives. There are sufficient grounds, therefore, for assessing any new synthetic bacteriostatic agent which seems likely to fulfil the necessary criteria. Many such synthetic chemicals are widely used by surgeons for the sterilization of wounds, burns, grafts, and other abraded surfaces, but in these instances the problem of epidermal sensitivity is not of great importance and they are not all suitable for use on the skin itself.

The qualities required of such a preparation are: (1) freedom from irritant action, (2) a low rate of sensitization, (3) a wide range of bactericidal or bacteriostatic activity, (4) ease of application and cosmetic acceptability, and (5) cheapness. Monilicidal or fungicidal activity would be an additional advantage.

We have recently carried out a preliminary clinical investigation of a new preparation claimed to have a wide spectrum of activity against pyococcal organisms, *Candida albicans*, and some fungi. This substance, dequalinium (decamethylene bis-(4-aminoquinaldinium) chloride), is marketed by Allen and Hanburys Ltd. as "dequadin."

The wide antibacterial activity of dequalinium *in vitro* was reported by Babbs *et al.* (1956), who found that it inhibited the growth of all of 21 species of pathogenic bacteria tested, including Gram-positive, Gram-negative, penicillin-resistant, and acid-fast bacteria; and some fungi. In a concentration of 100 μg. per ml. at 20° C. it destroyed within one hour 99.99% of organisms in a suspension of *Staphylococcus aureus*. Its activity was not inhibited by serum.

The local antiseptic action was demonstrated by injecting dequalinium solutions intraperitoneally into mice half an hour after lethal doses of bacterial suspensions had been injected into the same site. When streptococci were used, a dose of 0.9 mg. of dequalinium per kg. of body weight protected all mice from death, and when staphylococci were used 4 mg. per kg. was fully effective.

Clinical reports of the use of dequalinium for its local antibacterial action have been published by Trotter (1956) and by Fowler and Jones (1957). The former used dequalinium chloride in gelatin sponge as a bacteriostatic and haemostatic dressing after dental extractions in over 900 patients, and found it effective in counteracting and preventing sepsis and promoting healing. Fowler and Jones used a powder containing dequalinium chloride 0.1% as a wound dressing in veterinary practice. The powder was applied topically to accidental and surgical wounds in over 100 animals and was effective in controlling infections due to the common bacterial contaminants occurring in infected wounds in animals.

Clinical Investigations

We have used dequalinium on 241 patients suffering from various skin conditions. Of these, seven defaulted, and 254 clinical trials were completed on the remaining 234, 20 of whom suffered from two separate conditions or took part in two separate trials. The preparations used were dequalinium cream, containing 0.4% dequalinium chloride, and dequalinium paint (propylene glycol base) containing 0.5% dequalinium chloride. Dequalinium lozenges were used in a few cases.

In order to satisfy ourselves of the absence of toxic or irritant effects on the human skin, we first used these preparations on 12 patients with acute or extensive epidermal damage—eczematous, bullous, and ecthymatous. No adverse effects were encountered after a minimum of two weeks' treatment, and it was therefore considered justifiable to continue with a full trial. The trial was conducted in three parts.

Range of Activity

First, we applied dequalinium to a wide variety of skin diseases in order to determine its range of activity. The results are shown in Table I.

124 trials were carried out, the preparation being used for a period of two weeks in most cases and from four to six weeks in paronychiae and *Trichophyton rubrum* infections. Cure, or considerable improvement, resulted in 43

Table I.—*Response of Various Conditions to Dequalinium*

Diagnosis	Improved	Not Improved	Worsened
Pyococcal conditions:			
Impetigo	16	1	0
Folliculitis. Furunculosis	5	3	0
Neonatal staphylococcal infection	22	2	2
	43	6	2
Mixed infective conditions of various types:			
Intertrigo	10	4	0
Angular cheilitis	2	1	0
Paronychia (chronic)	8	0	0
Infectious eczematoid dermatitis and infected eczema	7	3	0
	27	8	0
Tinea infections:			
Tinea cruris and *T. pedis*	6	1	0
Cattle ringworm	1	1	1*
Trichophyton rubrum infections	1	2	0
	8	4	1
Other conditions:			
Stomatitis (aphthous, erythema multiforme, etc.)	4	4	0
Eczema (not infected)	3	6	2*
Non-infective ulcers and non-infective bullae	3	2	1
	10	12	3

* Sensitization reactions.

out of 51 trials in staphylococcal skin infections of various sorts, usually within a week. Good results were also obtained in conditions of mixed aetiology in which staphylococcal or monilial infections played an important part. A small number of ringworm lesions were treated, and in 8 out of 13 cases these cleared or improved. It is accepted, of course, that cattle ringworm in particular tends to remit spontaneously. Various conditions not primarily due to infective causes responded indifferently.

Therapeutic Effects

In order to establish that the therapeutic effects obtained were due to the active agent itself and not merely to the base or to spontaneous resolution, a second series of 36 patients were treated with both substances—that is, base and the base with dequalinium incorporated. Whenever possible, opposite sides were treated at random. Where this was not practicable the preparations were each used consecutively for a minimum period of five to seven days. The active preparation and the base were labelled and dispensed by the pharmacist or ward sister and applied "blind." The results are shown in Table II.

Table II.—*Comparison of Dequalinium With Inert Base*

Diagnosis	More Effective	No. Difference Between dequalinium and Base	Base More Effective
Infective conditions (e.g., impetigo, folliculitis)	12	3	1
Mixed conditions (e.g., intertrigo, infected eczema)	5 } 17	2 } 5	0 } 1
Non-infective conditions (e.g., acne, psoriasis, eczema)	3	8	2

Table III.—*Comparison of Dequalinium With Standard Treatment*

Diagnosis	Better than Standard Treatment	Same as Standard Treatment	Inferior to Standard Treatment
A. Conditions in which dequalinium was as effective as, or more effective than, standard remedies			
Staphylococcal impetigo	8	7	1
Boils and folliculitis	1	2	2
Infected eczema and otitis externa	13	6	5
Angular cheilitis	2	0	1
Intertrigo	7	3	1
Chronic paronychia	5	3	0
	36	21	10
B. Conditions in which dequalinium was less effective than standard remedies			
Gravitational ulcers	3	4	5
Eczema	0	2	4
"Pustular bacterid"	0	0	3
	3	6	12

In addition, six cases of "idiopathic" black hairy tongue were treated (see below). There was a significant difference in the activity of the two preparations.

Table II shows that the preparations containing dequalinium, when used in conditions where infection was present, were more effective than the bases alone.

Finally, dequalinium cream or lotion was used in comparison with preparations normally used by us—for example, dyes, neomycin ointments, hydrocortisone, etc. The two preparations were again allocated to sides at random, wherever possible. Where similar lesions could not be treated concurrently, however, the preparations were used consecutively. The results are given in Table III.

Comment

In conditions of pyococcal origin the results were the equivalent of those obtained with antibiotics and dyes, but a particularly gratifying effect was noticed in cases of secondarily infected eczema and infective eczematoid dermatitis around the ears and in the body folds. On the hairy areas, the beard, and scalp the paint was especially useful.

We have not yet had enough experience of the routine treatment of dequalinium in ringworm infections to assess its comparative effect against standard remedies; further trials are proceeding.

A small group of six patients with idiopathic black hairy tongues were treated. They had all had much previous treatment and had suffered from the complaint for more than six months. A variety of organisms and yeasts had been cultured from the mouths. These were probably of secondary significance only. In two cases where dequalinium paint was applied thrice daily, there was no difference between it and the base; in four cases the patients noticed an improvement in the appearance and taste while using dequalinium, but in only two of these did complete clearance take place. The four patients still affected were then given dequalinium lozenges in addition; one of these improved. The condition is subject to curious irregular remissions, and no firm conclusions can yet be drawn.

Bacteriology

As this was primarily a clinical trial bacteriological results are not discussed in any detail. If the clinical efficacy of dequalinium is confirmed, properly controlled bacteriological trials should be conducted separately. There are certain material difficulties inherent in a combined assessment, particularly in skin infections. For instance, the *in vitro* behaviour of the staphylococcus under controlled conditions is frequently different from that *in vivo*; the effective local concentration of a bacteriostatic depends upon tissue exudates and immunological mechanisms, and the problem of superinfection change of staphylococcal type in hospital material must be allowed for. We did not attempt, therefore, to control the results of treatment bacteriologically. But routine swabs were taken from the skin before and during treatment in a number of cases, and it may be of interest to mention the results of these.

From the affected area of skin 65 swabs were taken before treatment. Routine cultures grew no organisms, or commensals only, in 14 cases. A coagulase-positive staphylococcus was grown in 27 cases. In 15 of these the culture was sterile at the end of the first week of treatment, and, in a further 3 cases each, at the end of two and four weeks respectively. In the remaining 6 cases a staphylococcus was

still present. In 10 cases of leg ulcers, various Gram-negative organisms were grown, and these cleared in only four cases. Beta-haemolytic streptococci were cultured in an insufficient number of cases to merit comment.

From these routine bacteriological findings it seems likely that, at any rate so far as the staphylococcus is concerned, the clinical improvement obtained in most cases is reflected in the results of routine cultures from the skin.

Findings

In general we found dequalinium to be non-irritant even when applied to mucous membranes and the skin of infants. However, three cases of allergic sensitization were encountered. One of these was to the base and two to the active ingredient. The latter showed positive patch tests to the active cream and no reaction to the bases applied alone. This figure of 1.2% is low enough to be acceptable in practice, but occasional cases of sensitization will probably arise, as with other antibiotic and antiseptic agents.

Our findings may be listed as follows.

1. *Impetigo.*—Dequalinium is a clean and useful agent in this condition, and it has the great advantage of not creating antibiotic-resistant strains of staphylococci. The paint is particularly valuable in impetigo of hairy areas.

2. *Staphylococcal Neonatal Infection.*—Dequalinium constitutes an effective and most useful application in all forms of neonatal sepsis.

3. *Intertrigo.*—This condition, in which monilial or pyococcal infection is an important factor, responds well to dequalinium. (It was also very effective in a case of monilial balanitis.)

4. *Paronychia.*—Chronic paronychia of pyogenic or monilial origin responded well. (In all cases advice about keeping the fingers dry was given in addition to treatment with dequalinium.)

5. It may be used with safety and success in conditions in which infection is present together with eczematous changes in the skin. It has no specific value in non-infective conditions, but the cream appears to be soothing and is pleasant to use. It may have some value as a prophylactic in such conditions as acute cheiropompholyx, eczematized ringworm of the feet, and eczema of the scalp, all of which are particularly prone to secondary infection.

Summary

A new antibacterial agent, dequalinium, has been used on 241 patients suffering from various skin conditions. In the form both of cream and of paint it was used alone, in comparison with the inert bases, and in comparison against standard routine measures of treatment.

Dequalinium was found to be of considerable value in pyococcal infections of the skin, notably impetigo and neonatal staphylococcal infections. It was also of considerable value in skin conditions in which pyococcal or monilial infection played a predominant part. It also appeared to be of value in tinea infections in a relatively small number of patients.

Non-infective conditions did not respond, but were not made worse.

Dequalinium appeared to be as effective as antibiotic preparations and dyes and is pleasant to use, colourless, and relatively cheap. No irritant or toxic properties were observed, and it can be used on the mucous membranes and on the skins of infants. However, three cases of sensitization occurred, an incidence of 1.2%. In one of these the base was responsible.

We believe dequalinium to be a useful valuable preparation against pyococcal and monilial infections of the skin, and one that represents a welcome addition to dermatological therapy.

ADDENDUM.—Since writing this paper we have been supplied with a quantity of dequalinium cream containing 0.5% prednisolone. Some 37 cases of atopic eczema, pruritus ani et vulvi, intertrigo, and neurodermatitis have been treated with this preparation. This prednisolone–dequalinium mixture showed a superior effect to the plain dequalinium cream, when used in these states, where itching and reflex rubbing are very pronounced. There were no failures in this short series, nor was any sensitization seen.

We are grateful to Drs. G. R. Boyes and L. L. Banks for their help; to Messrs. Allen and Hanburys Ltd. for supplies of dequadin cream and paint; and to Dr. C. L. Greenbury for his interest and advice.

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SIZE OF THE ADRENALS IN JAMAICANS

BY

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Not only does the pattern of disease in Jamaica differ from that encountered in Europe but the response of the Jamaican to shock is poor. Because a difference in endocrine make-up may be concerned, the weight of the adrenal glands in the Jamaican was compared with that of the European.

Variations in total adrenal gland weight may be due to cortex or medulla or both, and for this reason the weight of both components was estimated in 10 glands covering the full range of gland weights. In 20 more glands the cortical thickness was measured.

Materials and Methods

The adrenal glands from 105 (67 male and 38 female) adult Jamaicans of all racial groups were examined. The glands, obtained from routine necropsies, included material from 10 male cases of sudden and usually violent death.

The glands were dissected clean of fat and connective tissue, blotted dry with filter paper, and immediately weighed in grammes to two places of decimals on an analytical balance before fixation in 10% formol-saline solution. Ten of the glands, covering the whole range of weights, were selected and the cortical and medullary masses estimated by a modification of the methods of Swinyard (1940) and Allbrook (1956). Frozen sections were cut at intervals of 2 mm. and the unstained sections projected at eight diameters enlargement on to photographic paper. The photographic enlargements were cut out and the cortical and medullary components weighed separately to give a ratio. From this ratio and the weight of the whole gland the cortical and medullary weights were calculated.

In 20 more glands the thickness of the cortex was measured by means of a micrometer eyepiece. Each gland was divided by three parallel cuts made lengthwise. Frozen sections were cut from three of the surfaces and four different fields measured on each section, giving 12 measurements of cortical thickness in each gland.

Observations

The average weight of the paired adrenal glands from 105 adult Jamaicans was 8.58 g. (4.55 to 14.14 g.). The average of the 67 males was 8.78 g. (4.55 to 13.94 g.) and of the 38 females 8.22 g. (5.08 to 14.14 g.). In the 10 male cases of sudden and usually violent death the average paired adrenal gland weight was 7.33 g. (5.40 to 10.38 g.).

The average paired adrenal gland weight of 46 normotensive males was 8.59 g. (4.55 to 13.82 g.), of 21 hypertensive males 9.21 g. (4.58 to 13.94 g.), of 22 normotensive females 8.10 g. (5.13 to 14.14 g.), and of 16 hypertensive females 8.39 g. (5.08 to 13.35 g.). The paired adrenal gland weight was independent of the body weight (Fig. 1).

The cortical weight, but not the medullary weight, was directly proportional to the adrenal weight (Fig. 2). The average cortical thickness as measured in 20 glands was 1.13 mm. (0.85 to 1.80 mm.).

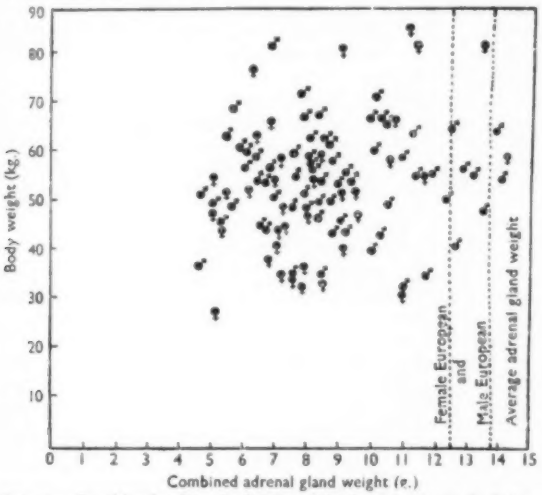

FIG. 1.—Combined adrenal gland weight in Jamaicans is independent of the body weight, and in most instances is less than the European average combined adrenal gland weight.

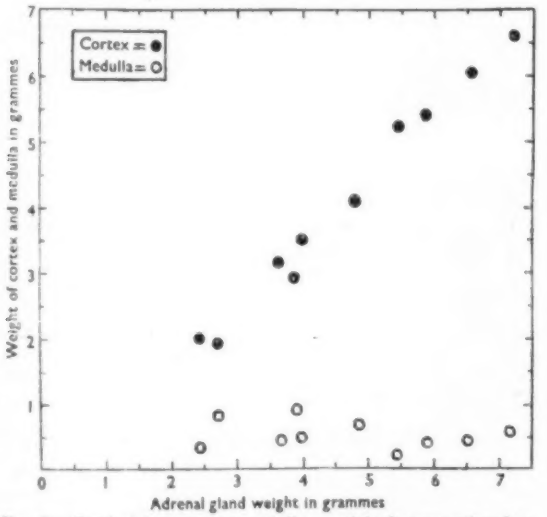

FIG. 2.—Cortical but not the medullary weight is proportional to the total adrenal gland weight.

Discussion

The average combined adrenal weight in the Jamaican male (8.78 g.) was less than that in the European male (13.82 g.) (see Table) and the difference was statistically significant (observed difference was 15.0 times the standard error). In the Jamaican female it was 8.22 g. and in the European female 12.66 g., and the difference was also statistically significant (observed difference was 11.16 times the standard error).

Average Combined Adrenal Gland Weights in Europeans and Jamaicans

	No.	Average Combined Adrenal Gland Weight	σ
European males (Roessle and Roulet, 1932) ..	328	13·82 g.	±2·80
European females (Roessle and Roulet, 1932) ..	277	12·66 ,,	±2·90
Jamaican males	67	8·78 ,,	±2·43
,, females ..	38	8·22 ,,	±2·18

Since the cortical but not the medullary weight was directly proportional to the adrenal weight (Fig. 2), the smaller adrenals in the Jamaican are almost certainly due to a reduction in the all-important cortical mass. This was not an unexpected finding, since the majority of Jamaicans are of African or mixed African and Caucasian descent, and Swinyard (1940) and Allbrook (1956) have demonstrated a smaller cortical mass in the African than in the Caucasian.

Further evidence of a reduced cortical mass in the Jamaican was obtained by measuring the cortical thickness. Only one report of cortical thickness for purposes of comparison could be found. Goldzieher (1946) gives figures of 2.1 to 2.5 mm. These measurements were made presumably on glands from subjects of Caucasian descent. In our material the average cortical width in 20 glands was only 1.13 mm. (0.85 to 1.80 mm.).

No general agreement exists on whether the adrenal glands in the male are heavier than in the female. Roessle and Roulet (1932), in a large series, found that they were, but Swinyard (1940), in a small series, found the adrenal glands in the female were larger in both the white and negro races. Goldzieher (1946) thought the male glands were larger, but Dawson (1956) found no difference. In the present series the slight increase in the male as compared with the female average was statistically inconclusive.

Enlargement of the adrenal glands has been described in a number of conditions, including hypertension (Dawson, 1956). In Jamaican hypertensive cases the average adrenal weight was higher than in the normotensive cases (9.21 g. to 8.59 g. in the male and 8.39 g. to 8.10 g. in the female), although the difference was statistically inconclusive. These values are far below the corresponding figures given for European hypertensive cases by Dawson (1956).

Biochemists investigating steroid metabolism have noticed that the endocrine pattern of Africans differs from that of Europeans. Barnicot and Wolffson (1952) report that the mean 24-hour urinary 17-ketosteroid excretion in Africans is about half that of Europeans and that this finding applies to Africans living in London as well as to those in Nigeria. Friedmann (1954) has found a similar low excretion in Southern India. It has not yet been possible to estimate steroid excretion in Jamaica, but Thorn tests carried out on 18 patients taken at random from the surgical wards suggest a functional adrenocortical deficiency (Keating and A. Bras, 1957, unpublished data). Circulatory insufficiency during and after surgery which responds to cortisone treatment is fairly common here (Keating, 1956), and it would appear that an inadequate adrenocortical reserve may well be usual in Jamaican coloured patients.

What part a small adrenal cortical mass plays in the different pattern of disease in the Jamaican as compared with the European can only be a matter of conjecture, since so many variables are involved. Nevertheless it is of interest that in Jamaica a high proportion of renal as opposed to essential hypertension is encountered, that myocardial infarction is relatively rare, and that polyarteritis nodosa is practically unknown. Also, a different or rather exaggerated response

to injury is suggested by the frequency of keloids and by a curious dissociation between peptic ulceration, which is common enough, and perforation, which is unusual.

Summary

The adrenal glands in Jamaicans are smaller than in Europeans.

This reduction in size is probably due to a reduced cortical mass.

It is suggested that this reduced cortical mass is concerned in the poor response to shock reported in Jamaicans and others of African descent. It may also play some part in the different pattern of disease encountered in Jamaica.

We thank Professor G. Bras for criticizing the text, Mrs. L. Chuck for statistical advice, Mr. L. G. Edwards for photographic reproductions of the graphs, and Dr. C. Hutchison for collecting adrenals.

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CONVERSION TESTING OF SCHOOLCHILDREN AFTER B.C.G. VACCINATION

BY

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In the absence of a specific test to measure resistance after B.C.G. vaccination, tuberculin conversion is generally accepted as the criterion of successful vaccination. The consistently high level of conversion produced by the Danish fresh B.C.G. in this country has raised the question whether testing after vaccination is necessary. The nurse, who may be exposed to repeated and heavy tuberculous infection, can legitimately expect a conversion test to confirm the success of her vaccination; this applies equally to other contacts. But where mass vaccination is given to individuals not at special risk there is not the same necessity for individual testing, provided that a vaccine is used which is known consistently to produce a satisfactory conversion rate.

In 1954 the medical officers of health of the nine local health authorities in the Oxford Region* organized a joint scheme for recording and analysing the results of the vaccination of 13-year-old schoolchildren; the object of the scheme was to find out whether the conversion rate was high enough to warrant dispensing with the conversion test in schoolchildren.

*Dr. T. Anderson (Oxfordshire County Council), Dr. G. F. Bramley (Gloucestershire County Council), Dr. E. C. H. Huddy (Berkshire County Council), Dr. E. Hughes (Reading County Borough Council), Dr. C. D. L. Lycett (Wiltshire County Council), Dr. C. G. Payton (Northampton County Borough Council), Dr. C. M. Smith (Northamptonshire County Council), Dr. G. W. H. Townsend (Buckinghamshire County Council), Dr. J. F. Warin (Oxford County Borough Council).

Standardization of Procedure

Only non-contact schoolchildren were included in the scheme; contacts were referred to the appropriate chest physician. One test only was used for prevaccination- and conversion-testing; in five areas the single test was a Mantoux 10 T.U., and in the other four it was the Heaf test. Tuberculin-testing and vaccination was carried out at the appropriate school or clinic.

At the first session the child was given either a Mantoux 10 T.U. or a Heaf test on the left forearm; the standard preparations of P.P.D. issued by the Ministry for each test were used. The second session was held two to four days later, when the test was read; the criterion for a positive Mantoux was 6 mm. of induration and over. Negative reactors were vaccinated intracutaneously with 0.1 ml. Danish fresh vaccine (0.75 mg./ml.). The third session was held not earlier than four weeks after vaccination, and the test used at the first session was repeated on the right forearm. The fourth session was held two to four days later, when the test was read and the vaccination reaction inspected.

The results were recorded on a special card which was coded at the Regional Records Department and punched on Powers-Samas cards. Only those record cards which showed that this standard procedure had been followed throughout were classified as valid for statistical analysis.

School Year, 1954–5

This year was spent in getting the scheme started. School medical officers were learning the technique of vaccination, while the medical officers of health were enlisting the aid of headmasters and obtaining consent from parents. Seven of the areas began vaccinating during the year, but two did not start until the following school year. Buckinghamshire County Council was unable to carry out conversion testing throughout, owing to staff shortages; figures from this area have therefore been omitted. The results for 1954–5 from the six areas are given in Table I, but in view of the many growing pains the results from this year are excluded from the final analysis.

TABLE I.—*Vaccination Results for the School Year* 1954–5

	Mantoux 10 T.U.	Heaf Test
Number of B.C.G. vaccinations	2,610	634
,, validly tested for conversion	2,387	632
,, of positive reactors	2,139	624
,, of negative reactors	248	8
Conversion rate	89·6%	98·7%

School Year 1955–6

This year saw the scheme in full operation, and it was hoped to reach a conclusion by the end of the summer term. Unfortunately the Ministry reported that the P.P.D. issued for Mantoux testing had been found to be substandard; this defect was observed in the autumn of 1955 and was rectified in April, 1956. The P.P.D. for the Heaf test was not affected. In consequence, although the Heaf test conversion rate of 98.1% was reliable, the Mantoux conversion rate of 94.7% had to be regarded as unreliable; it was therefore decided to continue the scheme for a further year. The results for 1955–6 are given in Table II.

TABLE II.—*Vaccination Results for the School Year* 1955–6

	Mantoux 10 T.U.	Heaf Test
Number of B.C.G. vaccinations	5,352	3,034
,, validly tested for conversion	4,756	2,869
Number of positive reactors	4,504	2,814
,, of negative reactors	252	55
Conversion rate	94·7%	98·1%

School Year 1956–7

No further troubles occurred during this year. Forty different batches of vaccine were used and valid conversion

tests were done on 10,422 schoolchildren. The results for 1956–7 are given in Table III.

TABLE III.—*Vaccination Results for the School Year* 1956–7

	Mantoux 10 T.U.	Heaf Test
Number of B.C.G. vaccinations	6,917	4,867
,, validly tested for conversion	5,676	4,746
,, of positive reactors	5,471	4,647
,, of negative reactors	205	99
Conversion rate	96·4%	97·9%

Discussion

It is generally held that a conversion rate of 95% to a Mantoux 10 T.U. is adequate. The Medical Research Council's current tuberculosis vaccines clinical trial found that a conversion rate of 85.8% to a Mantoux 3 T.U. P.P.D. produced protection.[1] The Tuberculosis Research Office of the World Health Organization gives figures showing the correlation between the Mantoux 3 T.U. and 10 T.U. after vaccination. In a group of 262 vaccinated persons, 235 were positive (6 mm. and over) to a Mantoux 3 T.U.; all except one of the negative reactors were given a Mantoux 10 T.U., and a further 23 became positive.[2] This suggests that 10 T.U. will discover about 10% more positive reactors after vaccination than 3 T.U. If a conversion rate of 85.8% to 3 T.U. produces protection a conversion rate of 94.4% (85.8+10%) to 10 T.U. should theoretically be adequate. This line of reasoning is admittedly tenuous, but it does give some grounds for accepting 95% as the criterion of satisfactory conversion to a Mantoux 10 T.U.

As the conversion rate to a Mantoux 10 T.U. was 96.4% and to a Heaf test 97.9% using 40 different batches of vaccine, it was decided that the conversion testing of non-contact 13-year-old schoolchildren is unnecessary.

Summary

A trial was carried out in the local health authority areas of the Oxford Region to determine whether conversion-testing after B.C.G. vaccination of non-contact 13-year-old schoolchildren is necessary.

The conversion rate of 5,676 children to a Mantoux 10 T.U. P.P.D. was 96.4%.

The conversion rate of 4,746 children to a Heaf test P.P.D. was 97.9%.

Conversion-testing of non-contact 13-year-old children is unnecessary.

I should like to thank the Medical Research Council for grants made to me, the Oxford Regional Hospital Board for the facilities they afforded me, and the Regional Records Department for coding and analysing the results.

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POSTSCRIPT.—The conclusion reached by this trial was accepted by the Ministry and has been incorporated in Memo 322/BCG (Revised 1958). The introduction of Glaxo freeze-dried B.C.G. has created a new problem, as it is desirable that laboratory control should be supplemented by clinical control on a sample of each batch. The Ministry has therefore requested the personnel of this trial to form a B.C.G. Control Centre at Oxford for this purpose. The Control Centre will make clinical observations on the conversion rate and the local reactions to vaccination.

The United States Council on Library Resources has awarded a grant of $73,800 to the National Library of Medicine, Washington, for the purpose of setting up and administering a research project on methods of improving bibliographical services through the use of mechanical equipment. The aim is to improve the efficiency of publication of comprehensive periodical indexes in broad subject fields. If successful, the methods will be used to produce the *Current List of Medical Literature*.

TUBERCULOUS MENINGITIS FOLLOWING B.C.G. VACCINATION

BY

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It is well recognized that B.C.G. vaccination may frequently be followed by complications due to the strain of organism in the vaccine. Such complications are usually limited to adenitis with or without suppuration and ulceration (Ministry of Health, 1958). In a few instances of tuberculosis developing after B.C.G. vaccine administration, it is the resulting immune process that has been overwhelmed by subsequent infection with virulent strains of mycobacteria. Miliary and meningeal forms of tuberculosis following B.C.G. vaccination are thought to be rare. This report is concerned with the development of tuberculous meningitis in a baby nine months after B.C.G. vaccination.

Case History

The patient was a baby girl of 11 months whose parents were known to suffer from pulmonary tuberculosis. She did not react to tuberculin, and on June 29, 1956, was given B.C.G. vaccine. When retested eight weeks later the tuberculin reaction had converted, giving an area of induration of 9 mm. and erythema of 12 mm. with O.T. 1:1,000. On April 1, 1957, over nine months after receiving B.C.G. vaccine, the baby was admitted to the meningitis unit, King's Cross Hospital. She had become ill eight days previously with listlessness, anorexia, vomiting, and insomnia. Loss of weight had been noticed, and immediately prior to admission the baby had become rigid.

On examination she was pale, irritable, slightly dehydrated, and had a high-pitched meningeal cry. Abnormal clinical findings were confined to the central nervous system. Signs of meningeal irritation were present with a moderate degree of cervical rigidity and Kernig's sign. The baby when disturbed was extremely irritable. There was no motor or sensory loss and cranial nerves were intact. Examination of optic fundi showed no papilloedema, and choroidal tubercles were not seen. Cerebrospinal fluid: pressure increased; cells, 230 per c.mm. (polymorphs 40%, lymphocytes 60%); protein, 180 mg. per 100 ml.; sugar, 7 mg. per 100 ml.; microscopical examination of the spider-web clot showed scanty acid-fast bacilli. Lung fields were normal on *x*-ray examination. Mantoux reaction: positive with dilution of 1:10,000 O.T. Blood leucocyte count, 17,000 per c.mm. (polymorphs 80%).

Treatment and Progress

Streptomycin, 0.05 g., was given intrathecally daily for seven days and 0.5 g. intramuscularly daily for 28 days. Isoniazid, 0.1 g., and *para*-aminosalicylic acid (P.A.S.), 2.5 g., were given daily by the oral route for a period of six months. The child's condition improved steadily and her temperature fell to within normal limits after one week. Signs of meningeal irritation disappeared. The cerebrospinal fluid examinations indicated a gradual return to normal levels. After four months the cell count was fewer than 10 cells per c.mm., and after six months the protein was less than 40 mg. per 100 ml. and the sugar content more than 45 mg. per 100 ml. No complications developed, and the baby was discharged from hospital in February, 1958, 10 months after admission. At the time of discharge she appeared to have made a complete recovery and was attempting speech and almost walking unaided.

Epidemiology

Some years before, in another area, the mother was found to have pulmonary tuberculosis and had two 90-day courses of streptomycin and P.A.S. Later, in August, 1952, typical acid-fast bacilli were demonstrated in sputum specimens on two occasions, but no further specimens have yielded acid-fast bacilli. The sensitivity patterns of the strain are not known, since the organism was not grown on culture. The father also was found to have a pulmonary lesion believed to be inactive, though it was still being observed at three-monthly intervals. The only other member of the family in the home, a brother of 19 years, had a lung cavity demonstrated radiologically in 1956, but at no time have acid-fast bacilli been observed or isolated from sputum specimens. The appearance of this lesion is improving on combined streptomycin and isoniazid therapy.

The source of infection of the child is not known for certain. A possible sequence of events is that the brother may have been infected from the mother, and he, in turn, may have infected his sister, since he had probably the most active disease in the family at the time of the baby's infection. Until the patient became ill, the family of four resided in a caravan which, however commodious in itself, was a "single apartment." Since three members of the family had evidence of tuberculosis the ready transference of infection is understandable.

Bacteriology

Isolation.—Paired Löwenstein–Jensen slopes inoculated with spider-web clot and deposit from two specimens of cerebrospinal fluid yielded innumerable discrete colonies after 26 days' incubation. Although it was noted at the time that the colonies tended to appear less craggy and dry than the typical human variety, they were not considered to be bovine in origin.

Sensitivity Pattern.—The strain was sensitive to 10 μg. of streptomycin per ml., 0.2 μg. of P.A.S. per ml., and 0.2 μg. of isoniazid per ml.

Virulence : Catalase Test.—The method used differed from that recommended by Middlebrook *et al.* (1954) in that individual colonies were selected and transferred to tubes containing equal quantities of 20-volume H_2O_2 and 10% "tween 80" solution. Control tubes containing a comparable inoculum of the $H_{37}Rv$ variety of *Mycobacterium tuberculosis* and a selection of recently isolated strains including atypical mycobacteria allowed of a comparison of the enzyme activity to be made. The time of appearance and the amount of oxygen liberated, shown by the bubbles at the surface with the strain under investigation, were similar to that of $H_{37}Rv$ and recently isolated virulent strains.

Animal Inoculation.—Various weighed inocula, 0.1–0.5 mg. of the test strain, were injected intraperitoneally and intramuscularly into four guinea-pigs. Examination at necropsy six to eight weeks later showed progressive generalized tuberculosis. Typical acid-fast bacilli were demonstrated in the spleen, liver, and lung, and, in addition, after intramuscular inoculation caseous lymph nodes were observed in inguinal, lumbar, and tracheo-bronchial sites. Typical cultures were isolated from such lesions. Following intravenous injection the strain did not produce progressive tuberculosis in a rabbit.

Summary

A case of tuberculous meningitis is described occurring in an 11-months-old baby who had been given B.C.G. vaccine nine months previously. The infecting organism was shown to be a virulent strain of *Mycobacterium tuberculosis* of the human variety.

Our thanks are due to Dr. W. H. Findlay, area chest physician, Perth, for details of the medical history of the family.

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HYPOPROTEINAEMIA AFTER PARTIAL GASTRECTOMY CORRECTED BY GLUTEN-FREE DIET

BY

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The nutritional disturbances following partial (Polya) gastrectomy are usually produced by defective absorption of iron, fat, and the vitamin-B complex (Wollaeger, Comfort, and Weir, 1946; Welbourn, Hughes, and Wells, 1951; Wells and MacPhee, 1954), and although nitrogen absorption is sometimes impaired, this rarely produces hypoproteinaemia (Wollaeger *et al.*, 1946). The deficiency of iron and vitamins may be corrected by giving large doses of these substances either by mouth or parenterally, but in order to correct serious deficiency states the Polya may have to be converted to a Billroth I gastrectomy, in which the blind loop is undone (Bruce, 1955).

It has been established that in most cases of idiopathic steatorrhoea the defective fat absorption is induced by gluten, and that after removal of gluten from the diet fat absorption returns to normal (French, Hawkins, and Smith, 1957). In addition it has been shown that a gluten-free diet corrects the associated faulty absorption of vitamins, minerals (French *et al.*, 1957), and nitrogen (McIver, 1952; Forshaw, 1957). There would appear to be no reason to expect that gluten could be responsible for the malabsorption following partial gastrectomy, and there have been no reports of the trial of a gluten-free diet in such cases.

The purpose of the present report is to describe the beneficial effect of a gluten-free diet in a patient in whom a low plasma albumin level producing oedema followed a partial gastrectomy; and to emphasize that severe impairment of nitrogen absorption may rarely occur without any apparent disturbance of fat and iron absorption.

Case Report

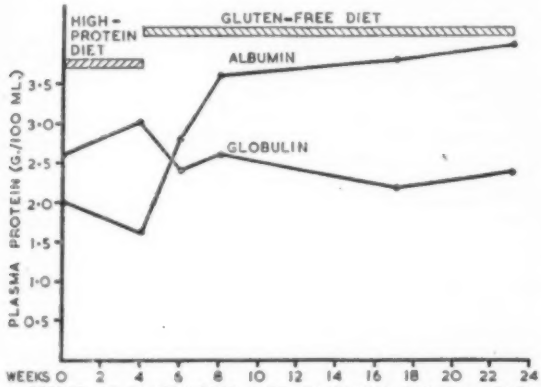
A man aged 47 was admitted to hospital in October, 1957. He had had a Polya gastrectomy for a duodenal ulcer five years previously. Following the operation he developed attacks of sweating and flushing of the face immediately after food, but otherwise his condition had been satisfactory for four years; he then developed diarrhoea and continued to pass between four and eight pale loose motions daily. During the past three months his mouth and tongue had been sore, and three weeks before admission he developed swelling of both feet and legs and a rash on the legs and abdomen. He thought that he had lost a small amount of weight since the partial gastrectomy, but his weight at the time of operation had not been recorded. There was no history of any significant previous illnesses.

On examination severe glossitis, cheilosis, and angular stomatitis were present. Both feet and legs were moderately swollen, and there was a patchy excoriated erythematous rash on the legs and abdomen. There were no abnormal neurological signs. His weight was 7 st. 2 lb. (45.4 kg.).

Investigations.—Radiographs of the chest and long bones were normal. Radiological examination of the gastro-intestinal tract showed that the stoma functioned normally and there was no evidence of stomal ulceration; there was no flocculation of barium in the small intestine, and the barium had been completely evacuated from the bowel

within 24 hours. Barium-enema radiographs showed no evidence of a fistula between the colon and the stomach or small intestine. The blood picture was normal: haemoglobin, 13 g. per 100 ml.; plasma proteins, 4.6 g. (albumin 2 g., globulin 2.6 g.; electrophoresis of globulin, normal); serum calcium, 8.1 mg.; serum sodium, 345 mg.; serum potassium, 18 mg.; serum iron, 105 μg.; serum bilirubin, 0.4 mg.; serum alkaline phosphatase, 8 King–Armstrong units; serum amylase, 120 units; and thymol turbidity, 2 units per 100 ml. Urea clearance test was 60% of average normal and urine normal. The glucose-tolerance curve showed a rise of the blood-sugar level to 180 mg. per 100 ml. half an hour after 50 g. of glucose and then a fall to 40 mg. per 100 ml. one hour later. Faeces contained no undigested muscle fibres; faecal fat content, 11.5 g. per 100 g. of dried faeces. A fat-balance test over seven days showed 91% fat-absorption.

Treatment and Progress.—Ascorbic acid, 500 mg., thiamine, 250 mg., nicotinamide, 160 mg., riboflavine, 4 mg., and pyridoxine, 50 mg. ("parenterovite"), were given daily intramuscularly for seven days, and subsequently vitamin-B complex was given by mouth for six weeks. The changes in the mouth and tongue rapidly improved, completely clearing up within three weeks of starting treatment. Treatment with a high-protein diet was given for one month, but during this time the oedema of the feet and legs persisted and the plasma protein level fell to 4.6 g. per 100 ml. (albumin, 1.6 g.; globulin, 3 g.) (see Chart). At this time his



EFFECT OF GLUTEN-FREE DIET ON PLASMA-PROTEIN LEVEL

weight was 6 st. 13 lb. (44 kg.). On November 20, 1957, treatment was started with a gluten-free diet. Within a month the oedema had completely cleared up, he had gained 7 lb. (3.2 kg.) in weight, and the plasma proteins had risen to 6.2 g. per 100 ml. (albumin, 3.6 g.; globulin, 2.6 g.).

On April 2, 1958, the improvement was maintained, and the plasma proteins were 6.4 g. per 100 ml. (albumin, 4 g.; globulin, 2.4 g.). He was feeling well and the mouth and tongue were normal. He still had slight sweating and flushing of the face immediately after food, and was passing three or four motions daily.

On July 9 he attended hospital complaining that the rash and swelling of the legs had returned a month previously, and he admitted that during the previous two months he had not been keeping strictly to the gluten-free diet. On examination there was oedema of both legs and the plasma protein level was 5.2 g. per 100 ml. (albumin 2.7 g., globulin 2.5 g.). He agreed to keep strictly to the gluten-free diet, and when seen on August 20 the oedema of the legs had cleared up and the albumin level had risen to 3.2 g. per 100 ml.

Discussion

Following both total and partial (Polya) gastrectomy the absorption of nitrogen is rarely impaired sufficiently to produce hypoproteinaemia. Blake and Rechnitzer (1953) found that the plasma protein level was invariably normal in nine patients at an interval between nine months and three years after total gastrectomy, and Welbourn *et al.* (1951) found that the plasma protein level was below 5.5 g. per 100 ml. in only one out of seven patients following a Polya gastrectomy, and this patient did not have oedema. Wollaeger *et al.* (1946) have shown, however, that after partial gastrectomy there is occasionally a slight excess of nitrogen in the faeces, and in one of their patients who developed hypoproteinaemia and oedema the nitrogen excess was considerable. Furthermore, they noted that excess faecal nitrogen did not tend to occur more often in those patients who lost the most fat in their stools.

The factors which have been thought to be responsible for the absorptive disorders following gastric operations are as follows: (1) impairment of the mechanism which stimulates the flow of pancreatic secretions and bile; (2) imperfect mixing of the food with digestive ferments owing to the shunting of the gastric contents away from the duodenum; (3) intestinal hurry: Wells and Welbourn (1951) decreased the amount of fat excreted in the faeces by slowing the rate of peristalsis with ganglion-blocking drugs; and (4) growth of bacterial flora in the stagnant loop may compete with the host for vitamins and damage the intestinal mucosa (Witts, 1955). Baird and Dodge (1957), however, found slight abnormalities in the jejunal mucosa in only 8 out of 31 patients following partial gastrectomy, and they conclude that the impaired absorption of fat and iron following partial gastrectomy cannot regularly be attributed to structural alteration in the jejunal mucosa. Most probably the relative importance of these aetiological factors varies considerably, thus accounting for the variation in the relative degree of absorption of fat, nitrogen, vitamins, and minerals in different cases.

In the case described here the correction of the low plasma albumin level by a gluten-free diet was unexpected, but the explanation that the impaired nitrogen absorption was primarily induced by gluten and unrelated to the partial gastrectomy seems too coincidental to be readily accepted. It will be necessary, however, to try the effect of a gluten-free diet on a number of such cases before a conclusion can be reached. If it is assumed that the impaired nitrogen absorption was produced by the partial gastrectomy, then the mechanism by which gluten contributes towards the absorptive disorder remains to be discussed. French *et al.* (1957) have suggested two possible explanations for the mechanism of defective absorption in cases of idiopathic steatorrhoea. Firstly, that gluten may produce an allergic reaction in the intestinal mucosa resulting in an increased secretion of mucus which delays absorption. Secondly, that there may be a failure to digest gluten which may lead to the development of toxic substances by intestinal bacteria. Although there is no evidence as yet to support either of these explanations, it is tentatively suggested that partial gastrectomy may occasionally produce a disturbance of gluten digestion, thus leading to the production of toxic substances capable of damaging the jejunal mucosa.

Summary

A case is described in which severe impairment of nitrogen absorption following a partial (Polya) gastrectomy was corrected by a gluten-free diet. The impaired nitrogen absorption produced a selective fall in the plasma albumin level, the globulin level remaining within normal limits.

Severe impairment of nitrogen absorption occurs only rarely after partial gastrectomy, and the nutritional disturbances are more usually produced by impaired absorption of iron, fat, and the vitamin-B complex. In the present case, although there were clinical manifesta-

tions of riboflavine and nicotinamide deficiency, there was no anaemia, and fat absorption was only slightly impaired.

My thanks are due to Dr. E. N. Chamberlain for permission to publish this case.

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Medical Memorandum

Arthropathy due to Gastric Carcinoma

Certain gastro-intestinal diseases are recognized causes of arthropathy or of finger-clubbing; for instance, ulcerative colitis (Schlicke and Bargen, 1940), steatorrhoea (Bennett *et al.*, 1932), and amoebic or bacillary dysentery (Rappaport *et al.*, 1951). Arthropathy may also be the presenting symptom in carcinoma of the bronchus (Berg, 1949; Holmes *et al.*, 1950; Ellman, 1953), but carcinoma of the alimentary tract associated with arthropathy is very rare, although finger-clubbing has been described in cases of carcinoma of the small bowel and colon (Mendlowitz, 1942) and of the stomach (Willemse, 1922).

There is no report of gastric carcinoma causing arthropathy, and so a case with this association is worthy of record.

Case Report

A single woman aged 64 had had periodic blood-stained vomits for 10 months, and for five months she noticed that food seemed to "stick" at about mid-sternal level, though she was able to eat solids normally. She had lost a few pounds in weight. For four months she had had pains in her knees, ankles, wrists, and small joints of the fingers. The pains in the fingers were so bad that she could not make a fist or grip with either hand, and had been taking 8 or 10 aspirin tablets daily.

Examination showed her to be well nourished, with moderate pallor. There was grade 1 finger-clubbing. The proximal interphalangeal joints and metacarpophalangeal joints of both hands were swollen and tender, and movements were limited in these joints. The wrists, ankles, and knees were not swollen, but movements were painful, and the ankles were tender. The dorsum of each hand appeared swollen. There was no bony tenderness.

Investigations.—Hb, 7.7 g./100 ml. (52%); M.C.H.C., 26%; M.C.V., 71 cubic microns; P.C.V., 30%; W.B.C., 11,200/c.mm.; E.S.R., 29 mm. fall in one hour (Wintrobe). C-reactive protein, +++; Rose's test (D.A.T.), 1 in 8. Serum proteins, total 5.8 g./100 ml. (albumin, 3.6 g.). Barium-meal examination showed a new growth of the cardiac end of the stomach close to the oesophageal opening.

Mr. D. Ioan-Jones removed the carcinoma, a well-differentiated adenocarcinoma with one lymph node involved. The joint pains disappeared two days after operation, and the swollen joints became normal within three weeks. Five weeks after operation the C-reactive protein was +; Rose's test (D.A.T.), 1 in 2.

Discussion

Pathogenesis.—The mechanism of a carcinomatous arthropathy is not clear. Removal of the primary tumour is known to relieve arthropathy at once (Clagett *et al.*, 1952; Ellman, 1953), and simple section of the vagi, which is thought to abolish a "neural reflex," has also caused instant relief of arthropathy (Flavell, 1956). The vagi were cut at gastrectomy in the present case, and so the prompt relief of her joint pains could have been due either to interruption of a vagal reflex arc or to removal of the gastric carcinoma. Our patient showed no signs to support two other hypotheses—"dyspituitarism" (Fried, 1943), and "toxic absorption" (Wooler, 1948) due to delayed gastric emptying (Preble, 1898; Dennig, 1901), and so the pathogenesis of her arthropathy cannot be defined.

Incidence and Sex.—Arthropathy is said to occur in 50% of cases of pleural tumours (Clagett *et al.*, 1952), but it has not been reported in carcinoma of the stomach, although Willemse (1922) described two cases with marked finger-clubbing and solitary gastric cancers. Analysis of the case records of the last 200 patients with a proved gastric carcinoma at this hospital has shown that not one had joint pains, only four had finger-clubbing, and two of these four had chronic lung disease more than likely to cause such finger-clubbing. The patient described above is a female, whereas osteoarthropathy associated with intrathoracic neoplasms (Bamberger–Marie syndrome) is much commoner in males (Gall *et al.*, 1951; Shapiro, 1956).

Joints Involved.—The joints which are involved most often in an arthropathy associated with carcinoma are the ankles, knees, wrists, and interphalangeal joints. Only these joints were affected in our patient, and the distribution of her arthropathy could well have been mistaken for early rheumatoid arthritis. Craig (1937), Berg (1949), and Frank (1952), have all stressed that rheumatoid arthritis may be confused with arthropathy due to carcinoma, especially when the primary tumour itself causes no symptoms.

Investigations.—Many workers stress that the E.S.R. is very high in patients with arthropathy due to carcinoma; for instance, Hansen (1952) and Holmes *et al.* (1950) report values of 70–120 mm. fall in one hour. This is not always the case, however, as Pattison *et al.* (1951) report values of 23–32 mm., which accord with the E.S.R. of 29 mm. (Wintrobe) in our patient. It is interesting to note that in our patient the Rose test (D.A.T.) titre fell from 1:8 to 1:2 after operation, and as 1:16 is the lowest significant titre for rheumatoid arthritis (Kellgren, 1957), this test might be useful in differentiating from the arthropathy due to carcinoma. A fever, often reaching 101 to 102° F. (38.3 to 38.9° C.) (Fischl, 1950), and a normocytic anaemia (Temple and Jaspin, 1948) may occur in pulmonary osteoarthropathy, but our case had different features: a low-grade fever, to 99° F. (37.2° C.) only, and a hypochromic anaemia due to blood loss.

I thank Dr. William Phillips and Mr. D. Ioan-Jones for permission to publish this case report, and Dr. Phillips for his constant help and encouragement.

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Reviews

RENAL DISEASE

The Kidney. An Outline of Normal and Abnormal Structure and Function. By H. E. de Wardener, M.B.E., M.D., F.R.C.P. (Pp. 338+viii; illustrated. 45s.) London: J. and A. Churchill, Ltd. 1958.

The enduring impression which this book will leave in the minds of those who know something about renal disease will be one of gratitude to the author for having had the courage to write a monograph on this most difficult of all subjects. There is probably no branch of medicine in which the scatter of knowledge is so great, so obvious is the contrast between the tremendous advances in our understanding of renal function in health and disease on the one hand, and our almost complete ignorance of the causation and rational treatment of most types of renal disease on the other.

On the whole de Wardener has overcome the difficulties with as much success as could be expected. His chapters on renal structure and function are clear and instructive and will appeal to the intelligent reader, and he avoids the temptation of over-simplifying and thus bringing his material down to the level found in most textbooks of medicine. With the difficult question of classification he is rather less successful. Wisely he tries to avoid the unnecessary and irrational complications of classification brought about by successive authors on renal disease, and prefers to describe syndromes of renal disease as they are found in practice. This treatment of the subject, sensible though it may be in some respects in the present state of our ignorance, tends to leave the reader with a fair impression of kidney disease as it may present itself at a certain stage of its development, but fails to give him as good a picture of renal disease observed over a period of years. Admittedly the information can be found in the book, and to those who already have long experience of renal disorders there is no difficulty; but it is rather like using a somewhat complicated map which is of more value to one who already knows the district than to one who has never been there before.

The book is intended primarily for students, and, though they will find much valuable material in it, one wonders whether the end-result will not be to confuse rather than to enlighten all but the best of them; but, as the less intelligent ones probably never read monographs, this may not matter very much, and the book can be strongly recommended to anyone who has a working experience of kidney disease and wants to get up to date with new knowledge.

ROBERT PLATT.

HORMONAL RESEARCH

Biochemical Contributions to Endocrinology: Experiments in Hormonal Research. By Sir Charles Dodds, M.V.O. (Pp. 76; illustrated. 18s.) Stanford, California: Stanford University Press. London: Oxford University Press. 1957.

The book is based on the Lane Medical Lectures of 1956 at Stanford University. It largely covers the researches of Sir Charles Dodds and his colleagues in the Courtauld Institute of Biochemistry, Middlesex Hospital, during more than thirty years. The development of highly active artificial oestrogens, of which the first was diethylstilboestrol (now more commonly known as stilboestrol), was a most striking contribution of Dodds and his colleagues, and in the chapters on the relation of chemical structure to oestrogenic activity he discusses how these developments came about. The account of the investigations which led from the first purely synthetic substance with oestrogenic activity, capable of inducing a full oestrus response in the ovariectomized rat in a dose of about 100 mg., to substances about a million times as active, is a most interesting and illuminating one. The agricultural application of synthetic oestrogens, discussed in a chapter of the book, is an outcome of wide importance of these investigations, while another is the use of stilboestrol in the treatment of carcinoma of the prostate. The pituitary gland and the control of gastric secretion, still a matter of discussion, the lack of simple relationship between the metabolic rate and the symptoms of myxoedema, the production of simpler substances with some of the activities of morphine, are other subjects touched upon in this interesting volume. The final chapter deals with the discovery of aldosterone at the Middlesex Hospital Medical School by Drs. Simpson and Tait. The full significance of this very important discovery is not yet finally elucidated, but it is certain that aldosterone will not remain the only or main representative of such a highly oxygenated naturally occurring steroid with biologically important properties. The researches of Sir Charles Dodds and his colleagues in the field of endocrinology have indeed been most fruitful, and this account of the master mind behind them is of outstanding interest.

F. G. YOUNG.

PHYSICS FOR ANAESTHETISTS

Physics for the Anaesthetist: Including a Section on Explosions. By Sir Robert Macintosh, D.M., F.R.C.S.E., F.F.A. R.C.S., William W. Mushin, M.A., M.B., B.S., F.F.A. R.C.S., and H. G. Epstein, M.A., Ph.D., F.F.A. R.C.S. Illustrated by Miss M. McLarty and Miss M. Beck. Second edition. (Pp. 443+xii. 60s.) Oxford: Blackwell Scientific Publications. 1958.

Before 1946 the knowledge of physics possessed by the average anaesthetist was distinctly sketchy, being based on hazy recollections of his First M.B. lectures. Attempts to remedy the deficiency were frustrated by the dearth of books dealing in simple language with the special problems which concerned him. One result was that many ingenious modifications of apparatus (and the anaesthetist is a notorious individualist) failed for lack of appreciation of some fundamental physical law.

When *Physics for the Anaesthetist* first appeared it was an immediate success and became the recognized textbook on the subject. The authors adopted the principle of using short and clear description supplemented by specially drawn diagrams which eliminated irrelevant factors while remaining essentially accurate. Some of the diagrams were in colour. This technique caused raised eyebrows among some of the pure physicists but has proved to be admirably suited for its purpose, and many a successful candidate for the F.F.A. R.C.S. has cause to thank the authors for it. The book has been out of print for five years and an up-to-date edition is most welcome. Dr. H. G. Epstein has joined the two original authors in revising and adding to the text. The main alteration is a section of over 130 pages on explosions, which are dealt with in exhaustive fashion. The dangers of induced currents from surgical diathermy are mentioned, but the risk of burns and explosions from secondary earths might be emphasized with advantage in future editions. The subjects of reducing valves and the flow of fluids have also been dealt with in much more detailed fashion than in the first edition. A list of conversion factors and some biographical notes on leading physicists add to the completeness and interest of this excellent book, which can be recommended without reserve.

C. LANGTON HEWER.

MEDICAL DISCOVERY

Modern Medical Discoveries. By J. G. Thwaites, M.B., B.S. (Pp. 234+xii; illustrated. 30s.) London: Routledge and Kegan Paul Ltd. 1958.

In the U.S.A. at the present time much concern is expressed about the difficulty of recruiting scientists. Great resources are available for buildings and equipment, but there are not always the men to use them. The reasons for this are complex, but there has been a tendency for politicians and educationists to treat education as a means of securing social conformity or equality rather than of promoting intellectual competition. Samuel Smiles and his doctrine of self-help are out of fashion and the modern shibboleth is "together-

ness." Nevertheless, a change is occurring, as it is realized that the struggle for survival will be hard in this overcrowded century and we shall need the best scientists we can produce. One way to get them is to make young people interested in science, to show them what the scientific life is like, and to encourage them to take it up.

Dr. Thwaites has written his book on modern medical discoveries for just this purpose and just this audience. It is addressed to readers of 16 to 18, but it will be of interest to intelligent people of all ages. It can be particularly recommended for non-medical graduates and technical assistants in medical laboratories as an introduction to medical research. It begins with three chapters on infectious diseases, their causes, prevention, and treatment. Then follow chapters on cancer, hormones, and blood, and three chapters on various aspects of radiology and ionizing radiations. Finally Dr. Thwaites deals with anaesthesia and surgery.

The author of a book of this kind must steer a course between over-simplification or dramatization on the one hand, and on the other so many reservations and qualifications that the book becomes dull and unreadable. Dr. Thwaites's writing is both vivid and accurate and his range of knowledge is wide. The chapter on radiation hazards is particularly well balanced and informed. Of course, the reviewer can always dot a few "i's." Ludwik Gross's work on virus in mammalian leukaemia and neoplasia is a good deal more convincing and exciting than Gye's, though it does not get us far in therapy, as it seems to suggest that most of us inherit and carry latent cancer viruses. The book is well illustrated. One hopes that it will be so successful that it will be possible to reduce the price of future editions.

L. J. Witts.

MENTAL DEFICIENCY

Mental Deficiency. By L. T. Hilliard, M.A., M.B., D.P.M., and Brian H. Kirman, M.D., D.P.M. With the Assistance of Four Contributors. (Pp. 517+xvi; illustrated. 60s.) London: J. and A. Churchill Ltd. 1957.

After the 1914 war the Fountain Hospital developed a considerable reputation through the enthusiasm and keen observation of Dr. Brushfield. Since the 1939 war the reputation has been revived by Drs. Hilliard and Kirman, and it is interesting to note the change in the field of research and in the outlook on mental deficiency. We are now in the midst of biochemistry, metabolic syndromes, well-founded genetics, sociology, and psychological researches. Indeed, some psychiatrists may be startled by Dr. Kirman's statement that mental deficiency is hardly a separate branch of clinical medicine, but the prime responsibility of the educationist and sociologist. However, he shows clearly in the rest of his 200 pages that it is really a subject which must be guided and controlled by men of medicine and of psychiatry. Whereas a generation ago there was too much emphasis on genetics as then understood, the present authors seem to have swung too far towards reliance on environmental conditions as causes and on their social improvement as treatment. Indeed, in some of the discussion of what ought to be there is almost a tone of propaganda, which is unexpected in a medical work.

The book is essentially a statement of the Fountain school of thought, and the views of its six authors are well integrated by Dr. Hilliard, who acted as editor besides writing the chapters on administrative and legal procedures. In the nature of mental deficiency there can be no very satisfactory classification, but that used here is logical and useful and the chapters are signed. Psychology and employment are by the psychologists, Drs. Tizard and O'Connor; causation and pathology are covered by Dr. Crome; while Miss Williams deals with education and training from the standpoint of the teacher. The clinical subjects are all set out by Dr. Kirman. All the subjects are presented in a thorough and sensible way, with no more repetition than is inevitable with a multiple authorship. Each chapter has its own extensive list of references, and there is some unusually full history of the progress of thought and practice in the subject.

This is a necessary book, and it is a comfort that it is written in such good and easy English, and so well presented by the publishers. Only two small errata were noted for correction in the next edition.

N. H. M. Burke.

TUMOURS OF BONE

Bone Tumors: General Aspects and an Analysis of 2,276 Cases. By David C. Dahlin, M.D. (Pp. 224+viii; illustrated. 87s. 6d.) Springfield, Illinois: Charles C. Thomas. Oxford: Blackwell Scientific Publications. 1957.

The topic of bone tumours is encumbered with two difficulties—a somewhat spurious nomenclature, and the fact that few individuals are able to acquire in a lifetime an adequate experience of these rather rare growths. Dr. Dahlin, by adopting without argument the names currently in fashion, does nothing to resolve the first, but he has been able to overcome the second by drawing on the superbly organized resources of the Mayo Clinic. The unique value of his book is that his statistics of sex and age incidence, localization, and other characteristics are based on substantial numbers of cases, each personally reviewed histologically and classified in a uniform and contemporary manner. The heterogeneity that often results from accepting the diagnosis of others, as in compiling reviews of cases from the journals, is thus avoided. The numbers in many of the groups are impressive—109 osteoclastomas, 80 chordomas, 70 reticulum-cell sarcomas, 141 Ewing's tumours, and so on. Osteogenic sarcoma, correctly defined as bone-forming, is identified by the direct formation of neoplastic bone, or histologically identified osteoid, by the proliferating malignant connective-tissue cells; the 469 cases are subdivided into osteoblastic, chondroblastic, and fibroblastic varieties according to the predominant line of differentiation. Bone that appears in a chondrosarcoma is held to result "from the differentiation of chondroid substance," and not directly as in the osteogenic sarcoma with cartilage. The point is arguable, but forms a practical basis for the classification, since it is here shown to have resulted in a marked distinction of characteristics of behaviour.

The excellent illustrations of radiographs, gross specimens, and micro-sections make the book an acceptable atlas which will serve a useful purpose. A few references are given at the end of each section, but there is no discussion of the literature, and the presentation is avowedly dogmatic and brief. Apart from its value as a concise, well-illustrated description of bone tumours, Dr. Dahlin's book is a considerable and original contribution to bone pathology on account of its factual record of a large experience simply, but carefully, analysed.

D. H. Collins.

Clinical Biochemistry, by Ivan Maxwell, is intended primarily for medical students, but may also serve as a compact reference book of test procedures for general practitioners. It is written by a former teacher at the University of Melbourne. The seventh edition (389 pages; 75s.) is available in this country from the Cambridge University Press.

Practitioners' Conferences, Vol. 5, edited by Claude E. Forkner (396 pp.; Appleton-Century Crofts, Inc., New York, 1957; $6.75), continues the series of verbatim reports of conferences held at the New York Hospital-Cornell Medical Center. These conferences have as their object bedside teaching and are intended for physicians, surgeons, general practitioners, and specialists. The present volume reports 14 conferences on a variety of subjects.

In *Eye Surgery*, first published in 1946, Mr. H. B. Stallard provides a full account of the technique of those operations which have an accepted place in current ophthalmic surgery. The third edition, now available from John Wright and Sons, Bristol (899 pp., 671 illustrations; 95s.), has been thoroughly revised and in part rewritten. It contains over 200 pages more than the previous edition; 150 illustrations have been discarded and 275 new ones, many drawn by the author himself, have been added.

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PROGNOSIS AND TREATMENT OF DISSEMINATED SCLEROSIS

Despite the variable clinical course of disseminated sclerosis, it is commonly assumed that all patients sooner or later become severely disabled. That this fact is regrettably true of the majority cannot be denied, but there is some evidence that a more benign form of the disease may exist. As D. McAlpine[1] has pointed out, there are some patients who make a good recovery from an initial attack of the disease, and relapses may then be mild and infrequent or may cease altogether. Of a series of 586 cases observed at the Middlesex Hospital, 13% of those followed for 15 years showed no disability.[2] L. Alexander and his co-workers[3] have confirmed that the disease exists in severe and mild forms, but point out that there is some overlap between the two. They believe that it is possible, five years after the onset, to predict into which of these two groups any individual patient will fall. This assessment is derived from a complex method—first devised by Alexander in 1951[4]—of allotting a numerical score to the various symptoms and physical signs roughly in proportion to the severity and significance of the resulting disability. Alexander claims that when different observers were asked to calculate the score for any single patient the results were remarkably consistent. By making this calculation at frequent intervals it was possible to obtain a graphic representation of the course of the disease. On this scale a score of 0 would be given if there were no symptoms or physical signs, while a totally disabled patient would achieve a figure of approximately 500. It is now suggested[3] that, if a patient should have a total score of less than 125 after the illness has been in progress for five years, a mild course can be confidently predicted, while if it is over 200 the progress of the disease is likely to be comparatively rapid and the consequent disability severe. Despite the obvious dangers in such a method of assessing disability in a clinically pleomorphic disease—dangers which are even more apparent in simpler indices of severity such as the ten-point scale devised by J. F. Kurtzke[5]—laborious measurements of this type do at least give a degree of objectivity which may be useful in attempts to assess the effect of treatment.

Though there may be some encouragement to sufferers, and to those who care for them, in the knowledge that the disease may sometimes be mild, the discovery of an effective treatment must remain a principal aim of research, since so many patients become crippled at a comparatively early stage. The multiplicity of remedies advocated at one time or another shows how many and varied have been the theories about the aetiology of the disease. Thus numerous bacterial vaccines have been given in the belief that the disease may be infective, as have arsenic and fever therapy.[6] There is little evidence that these methods have any value, though McAlpine[1] continues to advise arsenotherapy in some cases. Because narrowing or spasm of blood vessels has been suggested as an aetiological factor, histamine[7] and other vasodilators such as nicotinic acid have been tried. R. M. Brickner[8] believes that remedies of this type may have some benefit during acute episodes of the disease, but his results have not been confirmed. Many diets have also been devised from time to time, the latest being the low-fat diet of R. L. Swank,[9] but the rationale of this method is far from convincing. Treatment with liver extracts or vitamin B_{12} is extensively used in Britain, though there is little reason for prescribing these remedies and they are probably given *faute de mieux* rather than as rational therapy. Isoniazid, which has also been widely used, has been found to have no significant effect upon the course of the disease.[10] Physiotherapy is occasionally very helpful, though it has no direct influence upon the disease process, simply helping to relieve symptoms, as do drugs such as mephenesin, chlorpromazine, and zoxazolamine, which may sometimes reduce spasticity.

Much publicity has been given to the Russian vaccine which A. Shubladze and S. Gaidamovitch[11] claimed to be an effective treatment. This vaccine was prepared from the so-called E.H.A. virus isolated from cases of disseminated sclerosis in 1942 by Margulis, Soloviev, and Shubladze. At the begin-

[1] McAlpine, D., *Brit. med. J.*, 1957, **1**, 475.
[2] —— and Compston, N. D., *Quart. J. Med.*, 1952, **21**, 135.
[3] Alexander, L., Berkeley, A. W., and Alexander, A. M., *J. Amer. med. Ass.*, 1958, **166**, 1943.
[4] —— *Arch. Neurol. Psychiat. (Chicago)*, 1951, **66**, 253.
[5] Kurtzke, J. F., *Neurology (Minneap.)*, 1955, **5**, 580.
[6] Cloake, P. C. Humphry Davy Rolleston Lecture, 1946, quoted by D. McAlpine *et al.* in *Multiple Sclerosis*, 1955, Edinburgh.
[7] Horton, B. T., and Wagener, H. P., *J. Lab. clin. Med.*, 1948, **33**, 1611.
[8] Brickner, R. M., *Arch. Neurol. Psychiat. (Chicago)*, 1952, **68**, 180.
[9] Swank, R. L., ibid., 1953, **69**, 91.
[10] Kurtzke, J. F., and Berlin, L., *J. Amer. med. Ass.*, 1957, **163**, 172.
[11] Shubladze, A., and Gaidamovitch, S., *G. Mal. infett.*, 1956, Fasc. II, p. 173.
[12] Dick, G. W. A., McKeown, F., and Wilson, D. C., *Brit. med. J.*, 1958, **1**, 7.
[13] Shubladze, A. K., and Dick, G. W. A., ibid., 1958, **2**, 245.
[14] van Bogaert, L., *Rev. neurol.*, 1932, **2**, 1.
[15] McAlpine, D., Compston, N. D., and Lumsden, C. E., *Multiple Sclerosis*, 1955, Edinburgh.
[16] Pette, H., *Die akut entzundlichen Erkrankungen des Nervensystems*, 1942, Leipzig.
[17] Ferraro, A., *Arch. Neurol. Psychiat. (Chicago)*, 1944, **52**, 443.
[18] Glaser, G. H., and Merritt, H. H., *J. Amer. med. Ass.*, 1952, **148**, 898.
[19] Fog, T., *Nord. med.*, 1952, **46**, 1742.
[20] Miller, H. G., and Gibbons, J. L., *Brit. med. J.*, 1953, **2**, 1345.
[21] Smith, H. V., Espir, M. L. E., Whitby, C. W. M., and Russell, W. R., *J. Neurol. Psychiat.*, 1957, **20**, 1.

ning of this year Professor G. W. Dick and his co-workers[12] in Belfast reported that the virus from which the Russian vaccine was made was indistinguishable from rabies virus and that the vaccine might therefore be dangerous. A few weeks ago Professor Shubladze expressed his agreement with the findings of the Belfast workers in a letter[13] signed also by Professor Dick and published in this *Journal*. As a treatment for disseminated sclerosis this vaccine therefore no longer has any standing.

That disseminated sclerosis might be an allergic reaction of the nervous system to a variety of sensitizing agents was first suggested by L. van Bogaert[14] in 1932. Quite apart from the similarity between histological changes in the nervous system in this disease and those of acute encephalomyelitis, there is now more clinical evidence to support this view, to which an increasing number of workers subscribe.[2 15 16 17] Certainly there is evidence that relapses may follow non-specific infections, as they may follow fatigue, trauma, or emotional stress.[1] It is therefore not surprising that A.C.T.H., cortisone, and related remedies should have been tried in disseminated sclerosis. Results have been conflicting. G. H. Glaser and H. H. Merritt[18] reported that some of their 33 cases improved, as did T. Fog,[19] but H. G. Miller and J. L. Gibbons[20] concluded from their experience in 7 cases with acute neurological episodes that A.C.T.H. had no effect. However, Alexander and his co-workers,[3] using their "scoring" method of assessing disability, now believe that A.C.T.H. has a significantly beneficial effect upon the course of the disease. But no similar benefits were seen after treatment with cortisone or prednisone, and the authors suggest that the improvement was due to some adrenal hormone other than cortisone, a view which must be accepted with some reserve. It was also found that weekly blood transfusions reduced the liability to relapse, possibly through some factor in the donor's blood which enabled the patient to resist further encroachments by the disease process. In the absence of adequate controls it is impossible to be certain that these methods have a real place in treatment, but there is an increasing body of opinion which now favours a course of A.C.T.H., cortisone, or prednisone during acute episodes of the disease.

A lack of controls also makes it difficult to assess the findings of H. V. Smith and her co-workers,[21] who reported that intrathecal injections of purified protein derivative (P.P.D.) of tuberculin might modify the course of the disease. Their observation that Mantoux-positive cases of disseminated sclerosis show a modified reaction in the cerebrospinal fluid when P.P.D. is injected, as if a cortisone-like substance were being spontaneously produced, is of the greatest interest, but it is difficult to see exactly why treatment with P.P.D. should arrest the disease. Possibly it may act by producing widespread vasodilatation in the central nervous system. It is apparent that this is one of several methods of treatment arising out of recent research work which merit investigation in a series of carefully planned controlled trials. With the lively interest now being taken in disseminated sclerosis the patient with this disease and the doctor who must care for him may now discern a glimmer of hope.

THE DEAF CHILD

The possibility that her child may be born deaf is not one that usually occurs to the mother. Only if she is intimately connected with the problems of deafness, or if she has a fear of a hereditary tendency, is she likely to make observations on her child's reaction to sound. Fortunately only a few children are born with a defect of hearing, probably not more than one per thousand, but even so it is by no means a negligible problem. Deafness alone is serious enough, but it always has accompanying defects of speech and general development if it is not treated at an early stage. Thus the problem of early diagnosis is of fundamental importance.

The detection of deafness is not easy early in a child's life, for in the first few weeks the general behaviour of normal and deaf babies is much the same, but about the age of 4 weeks a normal child first becomes responsive to sounds associated with natural life such as the mother's activities and attentions and the sounds of other children. Later the normal child's response becomes more versatile, though not always predictable, for a given sound may not evoke the same response in all situations.[1–3] It is in observing these reactions that the parent is in a privileged position; indeed, many of the young deaf children referred to clinics are first discovered by parents because they noted abnormal responses at these early stages.

Deafness in early childhood may be due to a number of causes which include hereditary factors, prenatal infection, effects of chemotherapy, and mishaps at birth. Collaboration between doctors, parents, and audiologists can assure that, should one of these causes be suspected, adequate investigations can be carried out. In recent years school medical

[1] Gesell, A., *et al.*, *The First Five Years of Life*, 1940, Methuen.
[2] Lewis, M. M., *Infant Speech*, 1936, Kegan Paul.
[3] Valentine, C. W., *The Psychology of Early Childhood*, 1942, Methuen.
[4] *Educational Guidance and the Deaf Child*, 1957, edited by A. W. G. Ewing, Manchester University Press.
[5] Ewing, I. R., and Ewing, A. W. G., *Opportunity and the Deaf Child*, 1947, University of London Press.
[6] —— —— *Speech and the Deaf Child*, 1954, Manchester University Press.
[7] International Congress on the Modern Educational Treatment of Deafness (Proceedings in press), 1958, Manchester.

officers have taken great interest in the subject and more and more clinics are being set up where children suspected of deafness can be tested at ages from under 1 year onwards.[4] Dr. Mary Sheridan's article at p. 999 of this issue gives clear guidance about simple and effective tests of hearing which can be carried out in any quiet room.

The development of screening programmes, which some local authorities have also introduced, should be a valuable contribution, and adequate screening should dispel unnecessary worries. In such tests, carried out with great patience, observation is made of the child's response to quiet sounds similar to those occurring in normal home life rather than intense sounds which might arouse a fear reaction, with consequent lack of co-operation. Failure to pass screening tests indicates that the child should be referred to a deafness clinic for assessment of the degree of impaired hearing and the future treatment to be given. Here the aetiology and history are considered together with the problems of mental growth and the development of personality. While occasionally deafness may be amenable to medical treatment, in general the parent must be reconciled to deafness as a permanency and guided in the important task of accepting the fact so that he can assist fully in ensuring that the child gets the best treatment. Much is owed to Dr. Irene Ewing and Professor A. W. G. Ewing, of Manchester University, for their pioneering work in this field, and practically every deaf children's clinic in the United Kingdom and the Commonwealth is modelled on, or considerably influenced by, the clinics and procedures developed by them.[5,6] It is fitting therefore that the recent International Congress on the Educational Treatment of Deafness was held at Manchester and that one of the main subjects for discussion and demonstration was the problem of the young deaf child. It was apparent at this congress that many workers now consider auditory impairment to be a complex defect, and there was some evidence that in many cases of early deafness the central nervous system is defective as a result of trauma or maldevelopment, with or without peripheral defect.[7] It was stressed at the congress that many deaf children have begun to achieve similar patterns of development to that of a normal child through home training and integration in family life.

The problem of acquired deafness is different. Owing to the initial period of normal hearing the child will already have acquired some speech and understanding, and it is a question of conserving good speech by adequate educational treatment. In all this work the teacher of the deaf plays an important part. Great developments have taken place in hearing-aids during the last 20 years, and they are of particular importance in assisting the education of pre-school and school children. Reduction in size allows hearing-aids to be used on the youngest children, but they need to be used intelligently if they are to be of greatest assistance. In view of recent opinion that some deafness may be due to central damage without peripheral involvement, it would appear unwise to use intense amplification indiscriminately, whereas, if peripheral deafness is serious, high amplification may be required to stimulate the hearing organ effectively. In the schools, group aids are becoming widely used on a high fidelity system and there is evidence that this extension of the high frequency range, with consequent improvement of consonant articulation, is beneficial to many deaf children. In addition the loop or induction system is now in common use, permitting great freedom of movement, since no wires are connected between the children and the main amplifying system. The modern viewpoint on the educational treatment can thus be seen to exploit the advantages of normal speaking so far as possible, but on occasions deafness is accompanied by additional handicaps such as educational subnormality or functional disability. Here different treatment is necessary and the child may be unable to make progress by a purely oral method, so that finger spelling and greater use of writing have to be introduced.

SEPARATION OF CRANIOPAGUS TWINS

The condition in which Siamese twins are joined by the heads is referred to as craniopagus. It is the most infrequent situation for the union to occur, the incidence having been estimated at 1 in 2–4 million births. Of these the majority are stillborn or die very shortly after birth, and none have so far survived more than a few years, in spite of the fact that many of these children are apparently normal apart from the defect. A preliminary report on another case has recently appeared[1]; final separation is not to be attempted before the first birthday.

The site of junction is most frequently parietal, though occipital and frontal cases also occur. The axis of one child relative to the other varies from case to case, and the union may be asymmetrical. The intimacy of fusion differs in degree, so that vascular systems, meninges, and cerebral tissue may or may not be

[1] Franklin, A. W., Tomkinson, J. S., and Williams, E. R., *Lancet*, 1958, **2**, 683.
[2] Löwenberg, K., *Amer. J. Path.*, 1930, **6**, 469.
[3] Grossman, H. J., Sugar, O., Greeley, P. W., and Sadove, M. S., *J. Amer. med. Ass.*, 1953, **153**, 201.
[4] Voris, H. C., Slaughter, W. B., Christian, J. R., and Cayia, E. R., *J. Neurosurg.*, 1957, **14**, 548.
[5] Baldwin, M., and Dekaban, A., *J. Neurol. Neurosurg. Psychiat.*, 1958, **21**, 195.

united. The cause of the anomaly is unknown, but histological studies suggest that the foetuses are separate at an early stage and that union occurs after development is well under way, as though one was grafted on the other.[2]

Early attempts at separation were usually made after the death of one of the children, and none survived. The first successful attempt was made by O. Sugar in 1952.[3] Only one of these children lived, and he is developmentally retarded. The other died a month after operation without regaining consciousness. This was due to lack of duplication of the superior sagittal sinus, which made it necessary to divide much of the venous return from the brain of this child in order to effect its removal. The first operation in which both twins survived was performed by H. C. Voris in 1955.[4] The dural coverings of the brains were fused but separable, except for a portion of the superior sagittal sinus, which had to be split and covered by gelatin sponge. One child has developed normally, but the other has a prominent, though epithelized, cerebral hernia, and a left hemiparesis. Two years after separation, at the age of 28 months, she could nevertheless sit up unaided and say a few words. The most successful case so far was reported in August this year by M. Baldwin and A. Dekaban.[5] The children were craniopagus frontalis, the other two cases having been parietalis. One twin had a transient post-operative hemiparesis, but the later development of both was normal at the age of 1 year. So far as is known none of the skull defects has been repaired.

Although joined together, such children have independent personalities and an independent physiology. The electroencephalographic tracings differ. One can be asleep when the other is awake, one hungry when the other is replete. Although other anomalies may occur, the abnormalities are usually confined to the area of fusion. Having determined the degree of perfection of the individuals, the surgeon has then to discover how intimately they are joined, and to plan a means of providing epithelial covering for the defect which results from their separation. Plain radiographs may be difficult to interpret if the children do not lie in the same longitudinal axis, but an idea of the area of union and any cranial deformity elsewhere can be obtained. The greatest hazard to survival is the presence of anomalies of the dural venous sinuses. This is not surprising, since these sinuses develop within the layers of the dura, which may be fused. If there are not two satisfactory channels which can be separated, the venous return from one brain is jeopardized. Arterial union is less likely. Angiography is of assistance in showing separation of the circulations, but has not given conclusive evidence. Sinusography may be impossible owing to maldevelopment of the dural venous sinuses. Radioisotopes have not so far been used, but would appear to offer a possible means of confirming independence of the vascular systems. The electroencephalogram may show independent function of the two brains but does not offer proof that they are not united. In the case of Baldwin and Dekaban[5] direct fusion by a core of white matter was present (the E.E.G. was not done pre-operatively). This core was 2 cm. in diameter and contained a lacy network of vessels and one artery, which constituted the only major vessel that had to be divided. Ventriculography does little more than exclude other lesions of the brain, such as hydrocephalus, which was suspected in the less successfully treated twin of Voris and colleagues.[4] Deformity of the skull and brain, with flattening of the gyri and damage to the cortex, can be produced by pressure of the conjoined heads *in utero*.[2]

One of the major problems of these operations is to provide skin coverage for the two cranial defects. In the first two successful operations scalp flaps were gradually mobilized in preliminary operations, and their sources were grafted. Baldwin and Dekaban used the interesting technique of free grafts of "reconstituted human dura and skin" from a tissue bank, which were placed on the exposed dura. These provided temporary cover, and grafts of calf embryo skin were applied later. If the dura of the two children cannot be separated to cover the two brains, there is a grave risk of cerebral hernia, cerbrospinal fistula, and meningitis.

INTRACRANIAL NEOPLASMS AND PREGNANCY

Some diseases pose serious problems of management when the sufferer becomes pregnant—for instance, heart disease, diabetes mellitus, and thyrotoxicosis. The effect of pregnancy on chronic disorders of the nervous system has received less attention, though it is recognized that the course of epilepsy and disseminated sclerosis may sometimes be altered, a subject discussed in the Section of Neurology and Neurosurgery at the Annual Meeting of the B.M.A. at Birmingham recently.[1] It now appears that pregnancy may sometimes exacerbate symptoms in patients with intracranial neoplasms. E. R. Bickerstaff, J. M. Small, and I. A. Guest[2] point out that this is particularly true when the tumour is a meningioma.

These authors report two striking cases in each of which symptoms and signs indicating compression of one oculomotor nerve appeared during pregnancy, but regressed after delivery, only to recur during the course of one or more subsequent pregnancies. In one patient symptoms had been present during each of three pregnancies over sixteen years, with periods of apparent good health in between. Eventually unilateral visual failure appeared, and a sphenoidal wing meningioma was found to be present behind the affected eye. In

[1] *Brit. med. J.*, 1958, **2**, 315.
[2] Bickerstaff, E. R., Small, J. M., and Guest, I. A., *J. Neurol. Neurosurg. Psychiat.*, 1958, **21**, 89.
[3] Fischer, F., *Z. Augenheilk.*, 1935, **85**, 88.
[4] Hagedoorn, A., *Amer. J. Ophthal.*, 1937, **20**, 690.
[5] Rand, C. W., and Andler, M., *Arch. Neurol. Psychiat.* (*Chicago*), 1950, **63**, 1.
[6] Walsh, F. B., *Clinical Neuro-ophthalmology*, 1947, p. 1161, Baltimore.
[7] Weyand, R. D., MacCarty, C. S., and Wilson, R. B., *Surg. Clin. N. Amer.*, 1951, **31**, 1225.

the second case there had been similar attacks of diplopia, occurring during three pregnancies and sometimes in the premenstrual week, but each time resolving after parturition or during menstruation. Again a sphenoidal wing meningioma was discovered. Although this course of events is not common it has been reported by other workers,[3–7] and, as Small pointed out during the Birmingham symposium, a similar exacerbation of symptoms during pregnancy may occur in patients who have intracranial or intraspinal neurofibromas or angiomas.

A number of possible explanations for this relationship have been offered, among them that hormonal influences are responsible; but, as Bickerstaff and his colleagues suggest, it seems probable that a simple mechanical explanation is the correct one. Excess water is retained in the body during pregnancy and the blood volume is greatly increased. Presumably there is a parallel increase in the fluid content of these slow-growing intracranial tumours, and, because of their close anatomical relationship to the trunks of certain cranial nerves, even a very slight increase in size is sufficient to produce symptoms. R. D. Weyand and his colleagues[7] removed a meningioma from a pregnant patient and found unusual histological changes in the tumour, changes which were compatible with an increase in fluid content.

It is easy to understand why many patients who develop ptosis or diplopia during successive pregnancies should be regarded as cases of disseminated sclerosis or even myasthenia gravis, but, as Bickerstaff and his colleagues point out, the occurrence of oculomotor defects or unilateral scotomata during the latter half of pregnancy should lead to serious consideration of a diagnosis of sphenoidal wing, parasellar, or suprasellar meningioma. In such a case careful radiological investigation is worth carrying out, and, if necessary, surgical exploration of the area, since these neoplasms are easier to remove in the early stages. If left alone, they may cause irreparable visual loss or hemiplegia resulting from strangulation of the internal carotid artery.

SEX EDUCATION FOR STUDENTS

The demand from medical students for some instruction in dealing with sex problems is the inevitable outcome of the present trend in medicine to treat the patient as a whole. Of necessity this includes an understanding of the sexual development and adjustment of men and women. But the student's demand presents his teachers with some serious problems, for he is asking for a bridge across the gap that lies between his rather scanty factual knowledge of the physiology and anatomy of sex and an understanding of the complex emotional problems of sexual adjustment and maladjustment. The scope of the subject is wide, including as it does the physical and psychological aspects of coitus, conception and its control, the wide range of sexual behaviour encountered in practice, sexual maladjustments, and their causes and prevention, and the role of the doctor in sex education.

The first problem is who should be selected to teach the student and how he should be selected, what qualifications and experience, if any, he (or she) should have, and what kind of personality. Some decision might have to be taken on which department of the teaching hospital should be responsible for this type of education. Secondly, who shall be taught? Some students are scarcely sufficiently mature and stable to accept the emotional effort entailed in studying a subject of this kind. Not only is the student unaware of the emotional problems involved in marriage, but often ignorant of his own ideas, fantasies, and prejudices about the sexual and marital relationship. If students are to be selected for this teaching it would seem that only self-selection by means of a voluntary system could be acceptable. The drawback to this is the danger that those struggling with their own emotional problems are particularly attracted to the subject, and the resulting strain may precipitate a breakdown. Probably the subject should be included only during the senior years—which leads to the recurring problem of the overloaded curriculum and the proximity of final examinations.

The best method of teaching the subject is likewise debatable. Didactic lectures are valuable in providing a factual background, but do not prove a very successful method of teaching on emotional problems. Though books can be helpful, they are not sufficient in themselves. Perhaps most is learned from hearing patients talk of their anxieties and difficulties, but this is frequently rendered impracticable because the presence of the student inhibits free discussion by the patient. Case discussion groups of an informal nature may be more instructive, and this method has already been tried out at a few medical schools. In one London teaching hospital, as a result of some pilot experiments on these lines, a regular course of four case discussions, of an hour each, is now to be included in the curriculum of the obstetric and gynaecological clerkship, in addition to the voluntary attendance of students at contraceptive and dyspareunia clinics. Instruction is probably best carried out by a member of the staff who can be available to the students for discussion of their own emotional problems. When difficulties are encountered in starting this kind of training, help can be, and indeed is, sought from doctors who have had experience of dealing with marital problems through their work with the Family Planning Association and the Marriage Guidance Council.

As in all new undertakings, the way ahead remains rather obscure as yet, though the response of students to the sex education that has been attempted suggests that they themselves recognize a need for it.[1] No doubt trial and error will play its part in developing sound methods of teaching, so that young men and women will qualify better equipped to understand and help their patients than they sometimes are at present.

[1] *The Teaching of Sexual and Marital Relations to Medical Students.* Report of Symposium at Cardiff in November, 1957. British Medical Students' Association, 1958.

ARE MICROWAVES DANGEROUS?

In the light of past experience it is only proper to inquire into the potential health hazards associated with any innovation. The proposed use of high-intensity electromagnetic microwave radiations in civil and military communications is a case in point. The postal authorities are interested in them because they may offer an economic substitute for public inter-urban telephone links. Such centimetric radiations (i.e., radiations of waves a few centimetres in length) have been used by the Services for communication and other purposes for many years. But the question whether they represent hazards has become more acute only recently because the power fluxes at which the radiations are becoming available are much higher than before.

When non-ionizing electromagnetic energy is absorbed it is dissipated as heat. More specifically, when any tissue is exposed to microwaves its temperature rises. First, therefore, the question may be asked: Is there any part of the body which, on exposure to a given dosage of radiations of a specified wavelength, becomes so overheated that normal physiological cooling mechanisms fail to prevent permanent damage?

Although there is some disagreement on whether the crystalline lens or the testes are more exposed to danger, no one doubts that these two tissues are the most sensitive to temperature, because they cannot be effectively cooled by the blood stream. Consequently much work has been directed to elucidating the mechanism of dissipating microwave energy in these two tissues, largely in dogs and rabbits. An exposure of about 0.1 watt per sq. cm. for a total period of one hour failed to produce a lesion in either tissue in any experiment. Higher dosages can produce damage in the absence of alleviating circumstances: the animal heads are then virtually immobilized and the testes unprotected. It is sometimes said that a dosage of 0.1 watt per sq. cm. is bound to be harmless also when applied for very long periods because this represents the radiant power we receive from the sun on a cloudless day. However, the solar dose contains many types of wavelength, which are either absorbed more superficially or diffused more deeply than are centimetric waves, hence the radiation from the sun does not constitute a specific hazard for these two tissues.

Three instances have been reported in which patients are alleged to have suffered from exposure to high microwave fluxes. Two of the cases[1 2] are ill-attested and due to unreasonable risks having been taken. The third patient, also exposed to a relatively high intensity, suffered only transient ocular damage. On the other hand, numbers of Service personnel were, at one time or other, exposed to dosages of about 0.01 watt per sq. cm. for prolonged periods of time. No accident occurred. It is therefore of interest that the North Atlantic Treaty Organization has adopted as a safety limit one-twentieth of this figure—namely, 0.0005 watt per sq. cm. If this value errs it is, commendably, on the cautious side. It would appear, however, that such a limit would require a very extensive "sterilized" zone in front of the aerial system in the case of the high-power transmitters and large aerials now contemplated.

On the other hand, the proposal to use these waves indefinitely in 24-hour beams, as would happen in inter-urban radio links or in radar scanning, raises a problem altogether different. Feeble light intensities, when applied for a short time, may fail to blacken a photographic plate noticeably or to stimulate the eye, but can be successful after a prolonged exposure. The plate and eye are said to be able to summate intensities which for a brief exposure would be sub-threshold. Can temperature-sensitive tissues likewise summate successive sub-threshold microwave exposures? This question cannot be answered yet. There is some indication that, above a certain threshold, partial summation may occur in connexion with the crystalline lens, but that it is not as effective as photographic or visual summation.

What scanty evidence there is indicates that dog testes may summate more efficiently than the lens. Here efficient summation would be taken to mean that, if a given dose produces an effect in a given time, halving the dose would necessitate doubling the time for the same result to be achieved.

Beyond this the evidence is indirect. Glass-blowers used to suffer from cataract (their occupational disease) roughly three times as frequently as the remaining population. In the course of their work they are exposed to power dosages of up to 0.5 watt per sq. cm. This power represents largely light and infra-red radiation: the microwave contents of the energy are negligible. The glass-blowers tended to develop cataract after 10 to 15 years of continuous work. Although their type of cataract is not necessarily the same as that produced by high microwave fluxes, this example illustrates that the possibility of summation cannot be ruled out and that it may act only slowly. But the glass-blowers' 0.5 watt per sq. cm. is much higher than the N.A.T.O. microwave limit of 0.0005 watt per sq. cm.

In short, no hazard from microwaves is known for moderate exposures to fluxes lower than 0.0005 watt per sq. cm. in the absence of all protection. As to exposures extending over years, some risk may exist even with low dosages, but the probable temporal course of the hazard allows time for the requisite experimental investigation of the problem. Reliable answers to the questions it poses can be provided only by producing experimental lesions in man. As this is hardly practicable, the solution of the difficulty lies with electronic designers and engineers. Their task consists in by-passing man or so improving receiver sensitivities that low-power transmission becomes feasible. But, while the position cannot be viewed with complacency, there seems to be, at present, no cause for great alarm.

[1] Hirsch, F. G., and Parker, J. T., *Arch. Industr. Hyg.*, 1952, **6**, 512.
[2] McLaughlin, J. T., *Calif. Med.*, 1957, **86**, 336.

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Drug Treatment of Disease

SEDATIVES AND TRANQUILLIZERS: PART I

BY

WILLIAM SARGANT, F.R.C.P.

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Introduction

In considering the new sedatives and tranquillizers, it is worth remembering that it may take a year or more to learn how to use any one new drug skilfully and selectively; and all one can do is to keep a range of well-proved sedatives in use, and to look among all the new drugs for others likely to fill some of the present treatment gaps. It is certainly unwise to try one new tranquillizer after another in the hope of finding some universally applicable drug. There cannot be one, because of the number and variety of psychological reactions to life's stresses, and because of the different constitutional types of person showing them. These different types of person may all need handling in quite different ways with drugs. In this article advice will be given only on drugs which the writer has himself tried to learn how to use in as practical a manner as possible over the years. This does not mean there are not other similar ones, just as good, which may not happen to have been tried out and tested as thoroughly.

Two most important points about the giving of sedative drugs must be emphasized before discussing any of them in detail. Experiments on animals have shown that different constitutions may need quite different dosages of any drug used. In Pavlov's dogs, for instance, those with "strong excitatory" temperament often needed up to *eight* times the body-weight dose of sedative required by those with "weak inhibitory" temperament if an induced experimental neurosis was to be satisfactorily treated; until the right dose of any drug was found, the use of sedatives could often worsen rather than improve a neurotic state. It is the same with human beings.

Dosages of sedatives differ very widely in different illnesses and different constitutional types of person. This is shown, for example, in the response of the "strong excitatory" epileptic to a sedative drug such as phenobarbitone. He may thrive on 4–6 gr. (260–400 mg.) a day, given as a maintenance dose to prevent fits and to keep him in active nervous health. But a "weak inhibitory" hysterical patient may fall about and be greatly worsened by being given as little as ½ gr. (32 mg.) of phenobarbitone twice a day. Unless these large individual differences in response to drugs are recognized, the proper use of sedative drugs can be very difficult to learn, and the results obtained with standardized dosages can be most misleading.*

The other general point to mention is the possibility of harmful addiction to all such drugs. Any drug which successfully treats anxiety and tension, especially if it also creates states of euphoria, is likely to have strong addictive tendencies. In this article it is impossible to go into all the ethical considerations involved, but it is clearly our duty to try to confine ourselves to those drugs that do the least harm and have the least serious side-effects when from time to time they may have to be withdrawn or curtailed. To do this, it is wise to try to adhere, whenever possible, to drugs which, though they combat anxiety and tension, do not also create too much undesirable euphoria. Man's constant search for happiness can make these the hardest to give up.

*This is in fact one of the outstanding faults of most of the double-sampling tests of to-day. Moreover, neuroses and psychoses may get lumped together in such tests, and often more misinformation than information is gained about the skilled use of a drug being tested. As a good example of this, many schizophrenics are now thriving and having their symptoms held at bay with doses of chlorpromazine that may have to be as high as 300–500 mg. a day. On this dosage they are also possibly able to do a full day's work. Every doctor has other neurotic and depressive patients who complain of a marked worsening of their symptoms when more than 25 mg. of the same drug is given three times a day for comparatively short periods.

The Older Sedatives

Bromides.—Before the second world war potassium bromide was one of the most widely prescribed drugs in the *British Pharmacopoeia.* In recent years, however, it has tended to become discredited and to be replaced by the barbiturates. Bromide began to fall into disrepute when the numerous cases of bromide intoxication came to be more generally recognized. Its disuse, however, may now have gone too far. Intoxication rarely occurs, except in the elderly, the arteriosclerotic, and in patients with impaired renal function. Intoxication can practically always be avoided by not prescribing it for these types of patient, and by insisting that the patient taking this medicine should also take adequate salt. There are some strong and chronic tension states in which large amounts of barbiturate are necessary to bring any real sedative relief, and this often causes severe addiction, and even greater tension when attempts are later made to lower the dose of barbiturate or to withdraw the drug. There are patients with reactive depressions and strong body-builds, and those who show explosive outbursts of anger and tension, who can still be helped better by bromide in doses of 20–30 mg. three times a day than by barbiturates. Bromide should certainly not be forgotten by the physician in search of a suitable sedative for some of his patients with chronic tension. It may also be useful in supplementing a smaller daily dose of barbiturate. It is hard to believe that the enormous vogue for the bromides over so many years was without any foundation whatever.

Chloral.—This is another drug which has also had a long innings because of its excellent sleep-producing qualities, but which is now tending to be replaced by the barbiturates. However, with the increasing tendency to barbiturate dependence so often seen at the present time, and because of the craving that can be aroused by too injudicious a use of the short-acting barbiturates, the writer is finding that chloral still has a valuable role as an alternative sedative to the barbiturates, especially to avoid the building up of tolerance to barbiturates so that sedation may be given over long periods of time. Chloral should generally be given in doses of ½–1½ drachms (1.7–5.2 ml.) of the *B.P.* mixture, and it can sometimes be used to supplement smaller doses of longer-acting barbiturates, each enhancing the effect of the other.

Paraldehyde.—Paraldehyde is now less useful than formerly as a sedative and tranquillizer. It is an exceedingly valuable drug, and still has its limited place in helping to cope with the withdrawal symptoms of the alcoholic, especially in the "strong excitatory" and confused patient. But it is a bad sedative for routine use because of its unpleasant smell and its consequent social drawbacks. It acts quickly, effectively, and safely in an emergency. But where routine administration of paraldehyde has been indicated in the past, the giving of one of the new tranquillizers such as chlor-

promazine, together with smaller amounts of other sedatives is now often preferable, especially for the elderly. It does, however, still have a real place in the efficient sedation of physically ill and restless patients in hospital. Because it can be obtained freely without prescription, it is not advisable to give it out too liberally in general practice, especially to the alcoholic, the compulsive barbiturate addict, and all the other potential seekers after chemical euphoria and temporary oblivion, in particular the hysterical psychopaths. Doses of 1–4 drachms (3.5–14 ml.) can be safely prescribed by mouth, and it is worth remembering that 2–4 drachms (7–14 ml.) can be injected intramuscularly when necessary in an emergency.

Barbiturates.—The long- and short-acting barbiturates have now become the main standby of physician and psychiatrist alike. And they are often the sedative of choice both for the neurotic and for the normal patient. In general, the barbiturates are much cheaper than the newer tranquillizing drugs. However, the short-acting barbiturates have more addictive dangers than, say, the bromides, and this is possibly because they are often more efficient drugs for the purposes for which they are prescribed. The enormous range of barbiturates, and the number of different preparations of each, make it impossible to learn to use anything like all the possibly valuable ones. A clinician should choose for himself a few selected long-acting and short-acting barbiturates and learn how to use and vary these in his many different types of patient. Barbitone sodium, for instance, still seems to be an excellent long-acting sedative when given in doses of 5–15 gr. (0.32–1 g.) at night. It is often the drug of choice in depressive states, when early waking is much more of a problem than is getting to sleep at night. Long-acting barbiturates also seem to have less addicting and tension-creating qualities on withdrawal than do the shorter-acting ones. Phenobarbitone can be a satisfactory daily sedative for neurotic patients, in doses of ¼ gr. (32 mg.) three times a day to 1 gr. (65 mg.) twice a day, and many of the patients who used to be kept on bromides three times a day are now being maintained on this drug.

The short-acting barbiturates, of which sodium amytal and quinalbarbitone are good examples, can be very good indeed in relieving tension during the day and in bringing about sleep at night. The trouble is that they are often too efficient, and it is becoming more and more clear to the writer that short-acting barbiturates, when taken continuously over long periods, can perpetuate states of tension as well as relieve them. Great relief may be obtained for an hour or two after taking these short-acting barbiturates, but tension is soon created again, and further short-acting barbiturates are then demanded. Once the total dosage of amytal has reached 9 gr. (0.6 g.), or of quinalbarbitone 6 gr. (0.4 g.), in the 24 hours a vicious circle of self-perpetuating tension has often been created. The writer has seen some patients who have had one, two, or three modified leucotomies for relief of unbearable tension and who have turned out later to be barbiturate addicts. Their tension has finally subsided or been greatly reduced once this fact has been recognized and their drugs withdrawn or altered. When patients come to doctors complaining of states of chronic persistent tension, or a marked increase in recent tension for which they are demanding short-acting barbiturate medication, it should never be forgotten that addiction to and a previous unwise prescribing of such barbiturates may be the cause rather than the cure.

Despite these objections, the short-acting barbiturates can still be some of the most useful drugs we have at our disposal. They can be especially helpful in patients who have developed recent phobias of going out in the street, travelling by train, going in an aeroplane, or tackling any special new situation because of the anxiety aroused. But they should be used only occasionally and not as a routine in such anxiety-creating situations. Sodium amytal 1–3 gr. (65–200 mg.) or quinalbarbitone ½–1½ gr. (50–100 mg.) may be given one hour before the patient tackles the phobia. Another of the new tranquillizers, meprobamate, also seems to be helping this particular group, and therefore may be able to replace the short-acting barbiturates in some cases. But the other new tranquillizers, such as chlorpromazine, have not proved at all useful in this particular group of patients, who can often be so difficult to help.

One of the most popular combinations of drugs in recent years has been the giving of small doses of amytal and dexedrine together in the form of "drinamyl." One tablet only is taken in the morning at 8 o'clock and possibly again at lunch-time. The combination is of the greatest value as a tranquillizer in some mild depressive and tension states, but it is of no value in deep depressions, and can make patients with severe anxiety states more anxious. Because of the euphoria it creates this combination is in great demand by the chronic neurotic patients and should be prescribed sparingly. Those patients who benefit most by it should also be advised not to use the drug on at least two days in the week, so as to avoid tolerance to it being established too quickly.

Intravenous Use of Barbiturates.—The sedative value of barbiturates given intravenously can be great in certain psychiatric emergencies. If, following an accident or a shock of some sort, the doctor is called to see somebody who has suddenly lost the use of an arm, or voice, or is showing sudden onset of other hysterical symptoms, the slow intravenous injection of a short-acting barbiturate, such as sodium amytal or pentothal, to a point of relaxation and euphoria, combined with the use of immediate and strong suggestion by the doctor, will often break up and resolve the whole acute hysterical picture, and continued sedation for a few more days may then keep it broken up. In the last war the rapid treatment of acute hysterical reactions by the use of intravenous barbiturates has saved an enormous amount of pensionable chronicity since, and there is still a place for this valuable first-aid method in civilian practice to-day. Once hysterical or acute anxiety reactions are allowed to get fixed for even hours, let alone days, they can become much more difficult to get rid of again later.

(To be concluded)

PRIORY CHURCH OF ST. JOHN OF JERUSALEM

RE-DEDICATION BY ARCHBISHOP OF CANTERBURY

The Priory Church of St. John, Clerkenwell, heavily damaged by a German air raid on the night of May 10–11, 1941, and now restored, at a cost of £80,000, not only as the church of the Order of St. John of Jerusalem but also as the Order's assembly hall, was re-dedicated by the Archbishop of Canterbury, Prelate of the Order, on October 17. The Duke of Gloucester, Grand Prior of the Order, opened a memorial cloister and garden commemorating those members of the Order of St. John and of the St. John Ambulance Association and Brigade who lost their lives in the 1914–18 and 1939–45 wars. The church's crypt (Fig. 2), which escaped war damage, is one of the finest examples of 12th-century church building in London.

The original church of St. John Baptist was the chapel of the 12th-century Priory of Clerkenwell; it had a choir, which forms the present building, and a round nave larger than that of the Temple church and believed to have been destroyed in Wat Tyler's revolt of 1381—its outline is now traced in the roadway. Just after 1500 Prior Thomas Docwra constructed the large perpendicular windows of the choir and made other improvements, and the present Docwra family have given the wrought-iron gates which lead to the new memorial cloister.

The restored building is divided into three main sections—the church, with its crypt; the guard house; and the war memorial cloister and the staircase hall. The guard house contains a robing-room and vestibule and makes a striking entrance to the cloister (Fig. 3). Here an ancient piece of stonework found on the site has been incorporated in the

tracery and provides the inspiration for the cloister's design. The crucifix can be seen from the street through the wrought-iron gates. The interior of the walls of the 60-ft.-square church have been whitened, showing the texture of the mediaeval stones and the Tudor brickwork; the only colour is supplied by an occasional banner. This simplicity accentuates the beauty of the altar with its reredos incorporating 18th-century carving salvaged after the bombing and the two wings of the Weston triptych. The latter was given to the church by Grand Prior John Weston about 1480 to commemorate the Order's victory at the siege of Rhodes; unfortunately the centrepiece of this exceptionally fine example of 15th-century Flemish art is missing. Curtains can be pulled across in front of the altar to screen it during an investiture or conference. The lion-head handles on the church doors which were found in the ruins of the Muristan, site of the Order's original hospice in Jerusalem, were presented by Sir Harry Luke. The architects responsible for the restoration were Messrs. Seely and Paget.

The priory in Clerkenwell was never a hospital treating the sick, like St. Bartholomew's and St. Thomas's. It was the administrative headquarters of the Order of St. John in England, responsible for its estates here from which revenue was sent to Jerusalem and Rhodes for the Order's activities, both military and charitable. The Clerkenwell priory also recruited young noblemen to fight in the wars against Islam. After the reformation the buildings disappeared bit by bit, except part of the church, which remained as a chapel and was restored by Simon Mitchell, from whom it was purchased in 1723 by the Commissioners of Queen Anne's Bounty and made into a parish church. It ceased to be this in 1931 when it became again the church of the Order of St. John. Members of the St. John Ambulance Brigade throughout the Commonwealth have subscribed just over £4,500 for the furnishing of the restored church. Of the structural cost of the restoration, £20,000 has still to be found.

The restored church of St. John is not open to the public but may be viewed by appointment with the Curator of the Order, Miss Daphne Edmonds (CLErkenwell 6644), who will also show those interested the Order's museum at St. John's Gate, a part of the priory buildings erected in 1504.

[Sport and General Press Agency, Ltd.

FIG. 1.—Interior of the restored church, showing the reredos and altar. Behind the altar are mounted the surviving two panels of the Weston triptych.

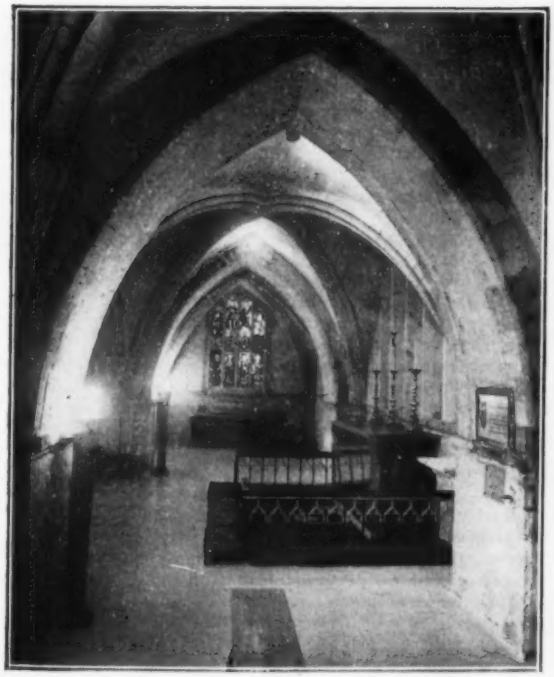

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FIG. 2.—Part of the crypt.

[Planet News, Ltd.

FIG. 3.—Guard house and Docwra gates, showing the crucifix and part of the memorial cloister beyond.

WHY SUFFER FROM RHEUMATISM?

A REVIEW OF 157 "CURES" SUBMITTED TO THE RESEARCH SUBCOMMITTEE OF THE EMPIRE RHEUMATISM COUNCIL*

Since ancient times man has been searching not only for the elixir of youth and the prevention of old age, but also for cures for the various aches and pains which harass the bones, muscles, and joints of mankind. These aches and pains derive from a very large number of mental and physical disorders, but all are loosely labelled "rheumatism" or "fibrositis" by the lay public, and even to-day there is in this country relatively little use of the terms "rheumatoid arthritis" or "osteoarthritis" by them. Accurate diagnoses aided by the use of new diagnostic methods are only now taking their proper place among members of our profession; it is by no means remarkable, therefore, that the layman lags behind. Unless an accurate diagnosis is made the effect of various therapeutic remedies cannot mean anything, for what benefits one patient's "rheumatism" will probably have no effect on another whose "rheumatism" is due to an entirely different pathological process. Indeed, it is estimated that there are over 70 different conditions which may give rise to so-called rheumatic pain. This simple fact is responsible for many of the false claims in the past: Mrs. A, who suffers from a traumatic disk protrusion, will begin to benefit (as her condition naturally subsides) whilst being treated with substance X, while Mrs. B, on the same substance but suffering from a progressive type of rheumatoid arthritis, worsens. Seldom do people outside the medical profession distinguish between the various arthropathies—rheumatism is rheumatism, fibrositis is fibrositis, and that is the end of it. Nature cures and family remedies may indeed have benefited some sufferers at some stage of their illness, but what that illness was in the majority of cases is never exactly known. *Post hoc, ergo propter hoc* is as common an argument to-day as it was under the Caesars, and just as difficult to resist.

It is with an open but not over-optimistic mind, therefore, that we have reviewed 157 remedies sent to us at the Empire Rheumatism Council in the last five years from all over the world. We are extremely grateful for these contributions, for from such as these may spring the next great therapeutic advance. Many contributors have been at great pains to give details and have gone to considerable trouble on behalf of the rheumatic sufferer. While most are submitted by people outside medicine, a minority come from members of our own profession. To all we would gratefully tender our thanks.

Analysis of "Cures" Submitted

The cures and remedies sent to us fall into three main groups. Group 1 states in effect that if you take X (or Y or Z) you will never have rheumatism; group 2, that if you take Y (or X or Z) you will get better from rheumatism; group 3, that if you never take Z (or X or Y) you will never get rheumatism.

The last (or never-never) group is the smallest. Five substances have been advanced as aetiological agents; if these are always avoided the patient will continue to remain free from symptoms. They have a homely ring: salt, tap-water, milk, tea, and marmalade. It may well be that sensitivity factors may play a part in causing pains due to allergic factors, but it is hard otherwise to make a case for these five agents of evil. Perhaps Western civilization suffers from the rheumatic disorders because of the breakfasts it eats, the United States being only partly saved by preferring coffee to tea. Three other contributions emphasize that tea is to be avoided at all cost. In addition, freedom from rheumatism may be assured by avoiding gases and certain fumes, eye-strain, and certain postures and stances. Here again it can be seen how certain mild painful disorders could be alleviated by attending to these factors, but not the more serious diseases such as rheumatoid arthritis.

Group 1, comprising the prophylactic agents, is also a small one compared with the therapeutic group 2. Iodine lockets, string shirts, underwear made of special material—for example, flannel, which is useless unless it is red—pendants, and bangles of various sorts are quoted. Many of these "cures" are almost as old as civilization; they are essentially lucky charms in many cases, protecting the wearer by their own particular magic. Some harness modern science to the ju-ju by incorporating iodine (or sodium carbonate) in a locket worn round the neck. A cord round the waist will apparently prevent disk herniation to-day just as effectively as yesterday it prevented lumbago and rheumatism in the back, and the day before that the evil eye, the ague, or the creeping palsy.

In the second therapeutic group the largest single subgroup is regrettably the "secret remedies," of which there are 14, details of which were to be revealed only at a price or on proper compensation. Nevertheless it is important and encouraging to note that all the remaining 143 writers offered and wished to give their remedy to mankind with no mention of any payment or reward, and this point must be strongly emphasized. Next most common were external applications (11), fluids and salts of different sorts taken by mouth (10), herbs (9), special diets (9), and special baths (7). After this came a large number of cures and remedies with relatively few supporters. It is of interest that in this scientific age there were only four remedies depending for their effect on radioactive substances, three on certain rays and emanations, and one on electromagnetic packs, whereas applications of mud had four supporters, "old-fashioned medicines" dispensed by senior chemists and practitioners two, and herbal remedies as noted above nine. Many, such as bee venom (3), gold salts (4), salicylates (3), to mention only three, have been, and are being, used in medicine to-day.

On the physical side, deportment (2), massage (1), various rays (3), a certain warm climate (1), and an unspecified mechanical device (1) were suggested; on the psychological or spiritual side a strong magnetic personality (1) and psychokinetic education (1).

Some of the Remedies

Water.—Water, externally or internally, has since the beginning of time been used in the treatment of the rheumatic disorders. In this series two cures depend essentially on the drinking of large amounts of plain water. In one, simple boiled rain-water is advanced as a cure; three-quarters to one pint, filtered through cotton-wool, must be taken early each morning to abolish rheumatism completely. A second cure is even simpler, depending essentially on drinking tap-water whenever the opportunity presents, all day and every day, and arranging one's life accordingly. A rival claim is that simple tap-water contains mineral salts and elements which initiate an allergic state which, by depositing salts in the joints, causes rheumatism; by avoiding these contaminants one can remain free from rheumatism. Ten cures depend essentially on consuming fluid in which certain curative salts are in solution in different combinations. These solutions may be naturally occurring ones from certain springs or may be made in the home—for example, Epsom, Glauber, and Rochelle salts and potassium "filtrate"—of this mixture one teaspoonful must be taken each morning.

Herbal Cures.—These are still much in evidence, and with special diets come fourth in popularity, nine of each type of remedy being submitted. Of these herbal cures one depends essentially on celery seeds, one on garlic, one on mistletoe, one on parsley, one on buttercup paste, one on yerba maté, one on mixed nettles, dandelion, and burdock leaves, and so on. They are essentially the old countryside prescriptions popular in the homes in the last century and obviously still widely used to-day. Only some depend on purgation for their effect, and, one, buttercup paste, on local inunction. To give an example in greater detail, one, yerba

*Compiled by the Research Subcommittee of the Empire Rheumatism Council.

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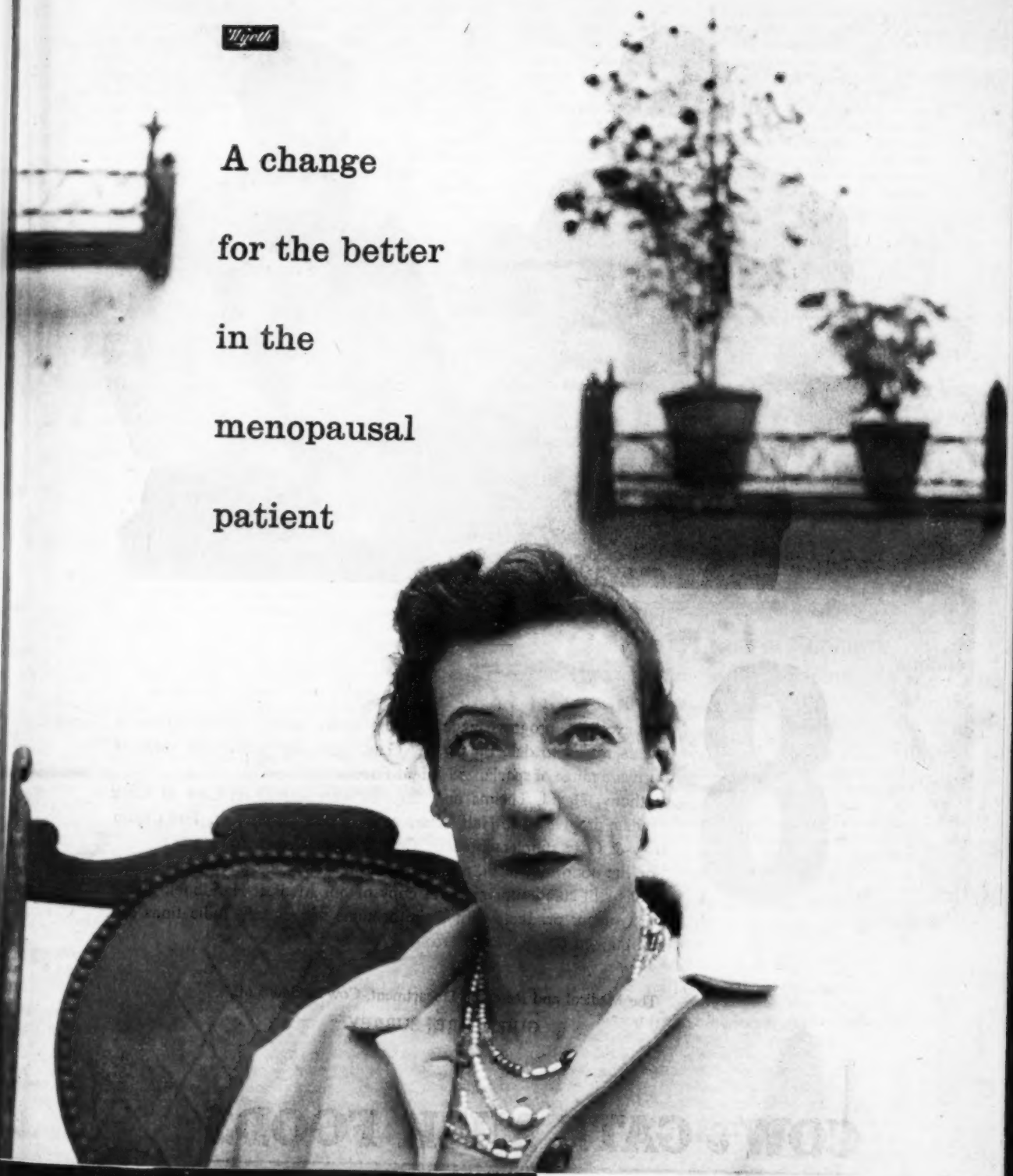

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maté, or Paraguay tea, is a beverage prepared from the leaves of the *Ilex paraguariensis*, a member of the holly family, Aquifoliaceae, which grows wild in parts of South America, and is also largely cultivated and has been used from time immemorial by the Indian natives. It contains up to 0.9% caffeine, and to this may perhaps be attributed much of its restorative and stimulatory properties. It contains no tannin and is preferred to either tea or coffee by many once the slightly bitter taste is acquired. It is, according to *Chambers's Encyclopaedia* (1950), the universal drink of 15 million South Americans, and is also popular in the United States. Our informant made the observation that when the quality of tea available during the war became very poor he changed to yerba maté. After the lapse of two to three years he noted that the fibrositis in his shoulders from which he had suffered for very many years disappeared ; but his wife, unable to take the tea because of its effect on her digestion, remained unimproved. This last point is important ; for herbal teas, although widely used for centuries, may on occasion in certain subjects be productive of most unpleasant symptoms.

Diet.—Nine different varieties of diet were submitted, most depending on calorie reduction and increased fruit-juice content. There is no doubt that even in severe rheumatoid arthritis one does occasionally see relief and remission occurring on such regimes ; fasting is one of the oldest of remedies in this field of medicine. What is not usually recorded is how long such remissions last and how many failures are to be set against each success.

Discussion

The first point that emerges very forcibly from the vast majority of the statements about curative agents submitted is that the diagnosis of the disorder that has been cured is completely unknown. When efforts have been made, as was done for the Empire Rheumatism Council by Dr. E. T. D. Fletcher and his unit at the Royal Free Hospital, London, some six years ago, to clarify diagnosis in connexion with a lay study of the importance of climatic variations, the patients with " rheumatism " and " arthritis " were found on examination to have a wide variety of conditions, ranging from rheumatoid arthritis to cases where no disease process whatsoever could be found. One does not know, therefore, what disorder has been " cured " except in very few instances. A second point is that with very few exceptions the numbers cured are not given, nor are the numbers not so cured on the same treatment—that is, the failures. Many cures are quoted on one case only, usually that of the writer of the letter, and these are in most cases the only ones where any detailed history is given. The third point is the complete absence of any comparable untreated control group with which the treated group may be compared ; this is hardly surprising in view of the large number of papers written on similar lines still appearing in medical journals in some parts of the world.

Finally, the probability that a natural remission has produced the beneficial effect rather than the curative agent is high in many if not most instances. It is well known to the medical profession that complete or partial remission may occur in any of the rheumatic disorders ; gout aborts in a few days, rheumatoid arthritis may subside rapidly for no apparent reason after months or years of continuous activity of the disease, and even degenerative joint disease may rapidly or gradually become less painful or even entirely pain-free. The fact that natural remission of disease occurs and that pain can disappear spontaneously does not seem to be properly appreciated by the layman. Effect, particularly if he is the patient, must be in his eyes preceded by a cause. Finally, faith in a therapeutic substance or method, even though misapplied, may often be followed by symptomatic relief, even if only temporarily.

Happily the sufferer with any form of rheumatic disease is usually an optimist, and he will try anything within (and sometimes without) reason which might conceivably help his painful condition, however bizarre it may seem. This high optimism is of the utmost therapeutic and prognostic importance ; without it the patient becomes a tired, exhausted cripple who has given up the fight. Almost anything which preserves his optimistic attitude and helps to keep the flame alight is worth while unless it is dangerous to health, crippling to joint, or exhaustive of pocket. Medical treatment may have to be extremely bad if it is to delay natural remission and recovery in some cases. It is a field of medicine, for this reason, that has attracted, perhaps in the past more than to-day, many odd forms of treatment and many unusual practitioners both within and without the medical profession.

Conclusion

The fact that so many communications have been received is extremely heartening. In the not very remote past the lay public was perhaps rather more concerned with the problems and prevalence of the rheumatic diseases than, regrettably, was the medical profession. The fact that large numbers of laymen attack the problem on their own and from their own particular points of view is not only encouraging but potentially of great importance, if only because some chance observation may well lead future research into fruitful new fields and herald some new major advance. We are extremely grateful, therefore, for the large number of communications received. All of them are recorded, and all are available should any research worker wish to consult them on any particular point. Where causes are unknown it is impossible to say that any factor, however seemingly improbable, may not later prove to be of the greatest importance.

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BRITISH INTERPLANETARY SOCIETY

SYMPOSIUM ON SPACE MEDICINE

[FROM A SPECIAL CORRESPONDENT]

On October 16 and 17 the British Interplanetary Society held a symposium on space medicine at B.M.A. House. If not the first international conference in the world to be devoted exclusively to the medical and biological aspects of space flight, it was certainly the first on this side of the Atlantic. Speakers came from the Netherlands, Sweden, and the United States, as well as from Britain. The chair at the four sessions was taken in turn by Dr. L. R. SHEPHERD, chairman of the British Interplanetary Society, Dr. J. B. PARRY, an Air Ministry scientific adviser, Dr. H. A. CLEGG, Editor of the *British Medical Journal*, and Professor E. P. SHARPEY-SCHAFER, professor of medicine at St. Thomas's Hospital.

Scope of Space Medicine

Hitherto the British Interplanetary Society has been mainly interested in the logistic and mechanical aspects of space travel. By comparison the human factors have been somewhat neglected, but upon these depend whether manned space flight is possible at all.

The likely physiological and psychological stresses of space flight are of two main sorts. First there is the question of survival for days or even months in a hermetically sealed, artificial microcosm. With increasing altitude there is a progressive loss of the protective and life-sustaining qualities of the atmosphere: physiologically speaking, space begins at sea-level. At only 40,000 ft. (12,000 m.), the ambient pressure falls too low for even a 100% oxygen atmosphere to fully oxygenate the blood, so that pressure-breathing or a pressure cabin becomes necessary. Above 52,000 ft. (15,850 m.), where the ambient pressure falls to

about 80 mm. Hg, the atmosphere theoretically loses all power to oxygenate the blood because its pressure is lower than the combined alveolar tension of carbon dioxide and water vapour. At 63,000 ft. (19,200 m.) the atmospheric pressure falls to 47 mm. Hg, which would allow the body fluids to vaporize. At altitudes of only a few-score miles, the loss of atmospheric protection is complete and the astronaut is exposed to all the rigours of interplanetary space, including ionizing radiation, bombardment with meteorites, and extremes of temperature.

The second kind are the physical stresses inherent in the dynamics of ballistic flight. For reasons of fuel economy, an orbital vehicle must be accelerated as quickly as possible to a velocity at which, in the frictionless vacuum of space, the pull of gravity is balanced by centrifugal force. When the motors are shut off, the projectile and its crew become weightless. This condition is the one stress of space flight which cannot be simulated in earth-bound laboratories, so that opinion on the importance of its physiological and psychological consequences varies. So far, weightlessness has been produced in man for periods of only about half a minute, in aircraft flying parabolic trajectories. The results of such experiments are inconclusive, and, as was pointed out in a paper by Squadron-Leader T. C. D. Whiteside (R.A.F. Institute of Aviation Medicine), the conditions were not fully controlled, as the subjects were also exposed to significant angular accelerations. Unfortunately for the astronaut, weightlessness and the delights of cosmic travel must be paid for in terms of heavy accelerative loads on take-off and return to the earth. In a brief review of human tolerance to sustained and transient mechanical forces in aviation, Flight-Lieutenant J. C. Guignard (R.A.F. Institute of Aviation Medicine) suggested that the patterns of ascent into orbit and re-entry into the atmosphere during manned space flight would be largely determined by physiological considerations.

Weightlessness and Disorientation

The first morning's session, which included the two papers already referred to, was a miscellany of communications devoted to fairly basic physiological aspects of orbital flight. Dr. M. P. Lansberg (National Aeromedical Centre, Holland), in a paper read by proxy, reviewed weightlessness and criticized some of the more lurid predictions of disordered physiology which have appeared in the astronautical literature from time to time. Vegetative functions, he reminded us, should not be significantly upset, since few vital activities are gravity-dependent. Some pessimists had apparently confused proprioception with disorientation and had predicted, for example, that a man in "free fall" would have no control over his limbs and no knowledge of their position. This belief was unwarranted, because, although the pattern of postural muscle activity might be expected to be altered in free fall, there was no physiological reason why proprioceptive sensation should be suppressed. There was a good chance, on the other hand, that considerable "relearning" of voluntary muscular activity would be necessary in order for the body to be accurately and safely moved about when weightless. Dr. Lansberg disputed the suggestion that, on prolonged ballistic flight, skeletal muscle would inevitably atrophy from inactivity and, perhaps also, a reduction in tonic impulses from various graviceptive organs. He admitted uncertainty, however, and suggested that space crews on long voyages might benefit from some kind of exercise regime. It has been suggested that astronauts would be troubled by constant feelings of falling. Curious sensations have been reported by subjects during parabolic flights, but the experimental conditions were not ideal. Owing to the latency of response of the vestibular organs and their integrating pathways, people are not disorientated during short "natural" accelerations (such as jumping). But no one was prepared to predict just what information the otoliths and other graviceptors would send to the brain during prolonged weightlessness.

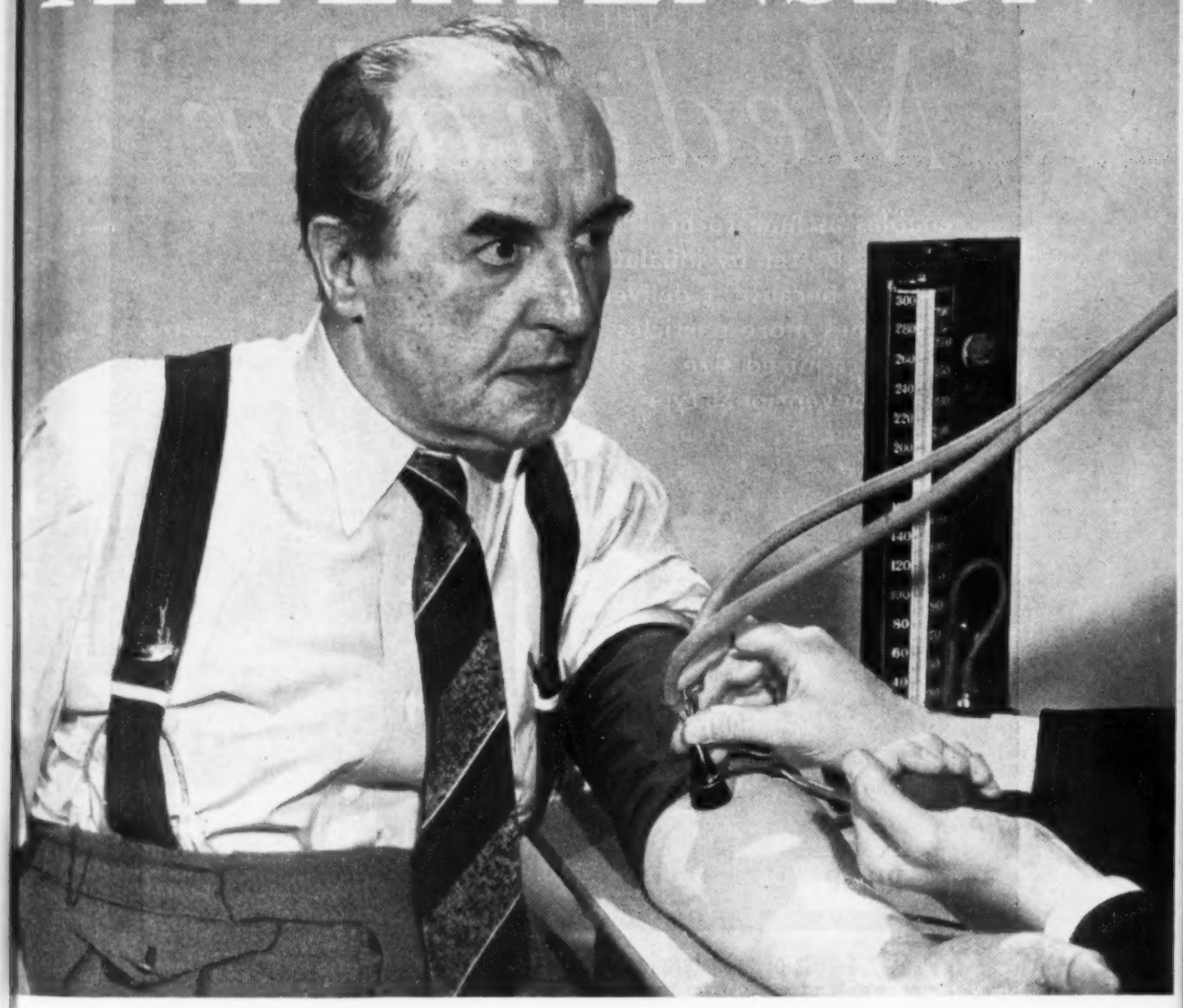
Several workers have suggested that, if weightlessness is undesirable, artificial (centrifugal) gravity should be produced by spinning the satellite—or at least its living-quarters. In the second part of his paper, Dr. Lansberg criticized some over-optimistic design studies (in particular von Braun's 40-metre radius wheel turning at 2/7 radian per second to give 1/3 normal gravity at the perimeter). It could be shown that moving about at walking pace would produce considerable changes in the force applied and, presumably, in subjective sensation. In addition, head movements in such a small spinning system might cause serious disorientation and even sickness by vestibular stimulation. Neurophysiological considerations, it seemed, might well determine satellite geometry.

The theme of disorientation and incapacity resulting from rotational accelerations in conjunction with weightlessness was continued in Squadron-Leader Whiteside's communication. He considered that, in some phases of space flight and ballistic aeronautics in which significant angular accelerations occurred, motion sickness would prove to be a major problem. However, the importance of experience and training, as well as the wide variation in individual susceptibility to vestibular stimulation, was already appreciated in aviation medicine. The same factors should operate in space flight. Dr. Whiteside also described the problems of vision at high speed and at high altitude. The limitations of human speed of perception and motor reaction effectively restricted the visual field when a person was travelling at very high speed. Even in present-day high altitude flight, difficulties of visual search and orientation resulted from such phenomena as intense glare, remoteness, and depression of the horizon, and in the absence of a definite fixation-point in the view ahead there would develop a physiological "empty-field myopia" (in which the eye tends to exert about one dioptre of accommodation). The inference was that the unaided eye would be of little use in space, either for search or navigation—or even, perhaps, for enjoying the view.

Psychological Factors

The afternoon session was devoted to the psychological aspects of astronautics. Commander G. Hoover (U.S. Navy, Office of Naval Research) began by giving a dissertation on the concept of the "man-machine system" in space flight and the factors which might be expected to influence its smooth running. The expected stresses and biological hazards of space flight were reiterated and the plea was made that minimal environmental protection should not be regarded as sufficient—in space craft or in any other vehicles. To get the best out of a man, the normal environment should be simulated as far as possible, and, in addition, the machine he controls should be designed around him in the light of his capabilities and limitations. An organization has been set up in the United States, we learned, called the Army-Navy Instrumentation Programme. The aims of this group, briefly, are to investigate the whole problem of man in control of a vehicle—whether on land, in the sea, in the air, or in space—and to think of every possible way of facilitating the integration of the man with his machine. The launching of the Army-Navy Instrumentation Programme was illustrated by an elegant film, a sort of documentary-fantasy, in which many of the ideas just presented—necessarily abstract—were expressed in animated cartoon form. After the film, a team of five more members of the U.S. Office of Naval Research held a round-table discussion on Commander Hoover's paper. In the main they restated in rather more detail the ideas already expressed. However, evidence of laboratory work was revealed in a short paper by Dr. H. E. Sheets (General Dynamics Corporation) on the culturing of algae—the unicellular plants which, it has often been suggested, might be used on long space-voyages to provide food and oxygen in return for carbon dioxide and human waste products. Dr. Sheets's communication aroused interested discussion, and it

HYPERTENSION



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Tenormal
Pempidine Tartrate TRADE MARK

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REFERENCES: *Nature* 1958, *181*, 1397; *Nature* 1958, *181*, 1717; *Lancet*, 1958, *ii*, 6.

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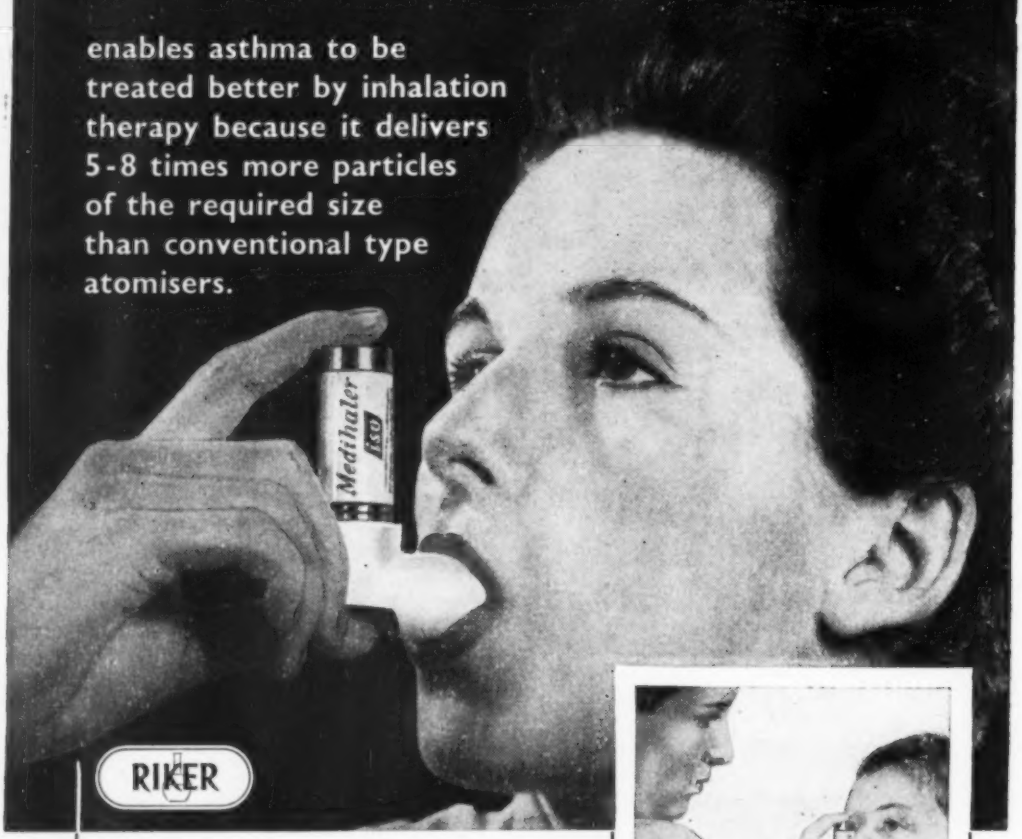

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Contains 7 mg. cc. Adrenaline Acid Tartrate B.P. in suspension in inert aerosol propellent. Dose delivered is equivalent to 0.15 mg. adrenaline base.

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became apparent that, although experimental systems using algae can be maintained in biological balance on a small scale, many difficulties would have to be overcome before they could be relied upon to provide human food and oxygen in a closed environment. Doubts were also expressed in a later paper by Mr. S. W. F. Hanson (Ministry of Agriculture, Fisheries, and Food) whether an entirely algal diet would ever be acceptable from either the nutritional or the psychological point of view.

Returning to the psychological theme, Dr. K. F. Jackson (R.A.F. Institute of Aviation Medicine) discussed some of the factors which impair human performance. Human performance in control, measured in terms of the accuracy with which pointers could be kept centred on a dial or an aircraft on its heading, could be affected by many variables. Some were obvious stresses applied, as it were, from without—such as environmental conditions affecting the equipment or the operator himself. Less well defined factors, including fatigue and motivation, caused changes in performance. Dr. Jackson's results related fluctuations in performance quantitatively to, for example, the time spent on an arduous task and to its complexity. The application of his work to astronautics would lie in determining the optimum "working conditions" and the best methods of presenting information and the means of control to the human pilot—"the most economical and versatile kind of controlling equipment that can be carried."

Sensory Impoverishment

Mr. C. Cunningham (Air Ministry) then discussed some effects of sensory impoverishment and sleep deprivation, both of which are predicted for space flight. In fact, feelings of mental pressure and perceptual disorder have already been reported by pilots in high altitude straight and level flight, or balloon ascents, where they are exposed to solitude and a reduced sensory input. Mr. Cunningham described experiments involving total sensory isolation, but compared the situation in space flight rather to certain patterns of political imprisonment. He argued that, in space flight, sensory impoverishment would be far from complete; the pilot would have jobs to do and he would also be kept in touch with reality by the motive of self-preservation during his enforced confinement. The effects of "acute" sleep deprivation in some ways resembled those of alcoholic intoxication, but prolonged sleeplessness without ill effects was possible for those who had been trained to it.

Environmental Hazards

Among several papers dealing with physiological aspects of the sealed-cabin environment was one by Dr. G. Pugh (National Institute for Medical Research) which discussed possible economies in the requirements of oxygen and other equipment for short space flights lasting a few days. Payload, including structural weight, was at a very high premium in astronautics, and for this reason a low-pressure cabin was often envisaged. Acclimatization studies suggested that, not only could economies in oxygen and food be made by reducing dietary intake (to, say, 1,000 calories a day), but that preconditioned men could work at a reduced atmospheric oxygen tension. An equivalent altitude of 18,000 ft. (5,500 m.) was suggested. Dr. Pugh warned, however, that the cumulative hazard from endogenous carbon monoxide contaminating the cabin air would be intensified at a low oxygen tension. A further possibility of economy in space flight, which caught the imagination of the press, lay in the selection of very small people for crew members.

One of the anticipated hazards of space travel is heat stress, and in two detailed papers Flight Lieutenant J. Billingham (R.A.F. Institute of Aviation Medicine) discussed problems of heat exchange between the man and his local environment in space. In many situations (for example, a re-entering vehicle heated during rapid penetration of the atmosphere or a man in a "space suit" on the surface of the moon), it would be difficult to protect the man from excessive heat gain. The approach to this problem lay in the design of protective clothing and in artificial, positive cooling of the man in the vehicle.

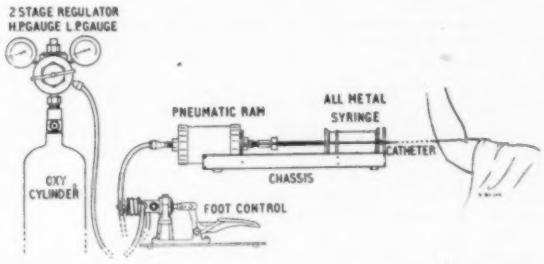
Discussing the final and as yet ill-defined hazard of flight outside the atmosphere, Dr. A. E. Slater (British Interplanetary Society) described the finding of an intense belt of ionizing radiation girdling the earth. This zone, discovered by radiation monitors in the Explorer satellites, extended from, perhaps, 600 to 60,000 miles (966 to 96,600 km.) above the earth and was believed to consist of high-energy protons arising from cosmic-ray bombardment of the upper atmosphere and trapped by the geomagnetic field. Since the radiation counters indicated that a lethal dose might be acquired in a few hours, the prospects of manned space flight looked gloomy. However, there was evidence that this intense radiation was a local phenomenon—restricted to certain geomagnetic latitudes, which—like the Sargasso Sea of yore—might be avoided by navigation.

Other contributions included papers by Dr. H. Bjurstedt (Laboratory of Aviation and Naval Medicine, Stockholm) on the effects on pulmonary ventilation of prolonged exposure to positive *g* loadings, and by Dr. A. S. Parkes, F.R.S., and Dr. Audrey Smith (National Institute for Medical Research) on space transport of life in the frozen state.

New Appliances

A PRESSURE INJECTOR FOR USE IN ANGIOCARDIOGRAPHY AND AORTOGRAPHY

Dr. J. N. Pattinson and Dr. Walter Somerville, of the Department of Radiodiagnosis and Cardiology, the Middlesex Hospital, London, write: The efficient injection of contrast medium is an important factor in the production of good-quality angiocardiograms. Our initial experience with simple manual injection soon revealed the shortcomings of this method and the need for a pressure device to ensure a rapid and safe delivery. Unassisted manual methods cannot achieve an adequate rate of injection through a cardiac



catheter or long "polythene" tube. The great advantage of selective angiography in its various forms, including thoracic aortography, further encouraged the development of the apparatus described below. At our suggestion Mr. H. A. E. Talley designed a vacuum-operated device along the lines of that described by R. H. Morgan (*Amer. J. Roentgenol.*, 1950, **64**, 189). This proved unsuitable, and a change-over to positive-pressure actuation was made.

During the course of the last six years several minor modifications in the design have been made. The apparatus consists of a pneumatic ram mounted on a chassis which can hold an all-metal syringe of 25-, 50-, or 100-ml. capacity. The ram is connected to a cylinder of compressed oxygen, air, or nitrogen through a two-stage variable pressure-regulating valve fitted with an output pressure gauge and

foot or hand control (see Diagram). When the latter is depressed the compressed gas passes to the ram, which applies a thrust to the piston of the syringe and empties it. The release of the foot or hand control immediately exhausts the gas in the ram to atmospheric pressure. In practice we have used only two gauge settings—one of 90–120 lb. per sq. in. (6.3–8.4 kg. per sq. cm.) for injection through a catheter, and the other of 25–35 lb. per sq. in. (1.8–2.5 kg. per sq. cm.) for intravenous injection. The actual pressure applied to the ram is seven times that indicated on the gauge.

When employing selective angiocardiography a cardiac catheter of the largest bore possible is passed under fluoroscopic control through a peripheral vein into the heart. The catheter tip is placed in the superior or inferior vena cava, right or left atrium, right ventricle, or pulmonary artery, the exact site depending on the type of case under investigation. For thoracic aortography the catheter is inserted into the radial artery immediately distal to its origin, and is advanced into the ascending aorta so that its tip lies 2 in. (5 cm.) distal to the aortic valves. Alternatively, a polythene tube may be inserted percutaneously into brachial, carotid, or femoral arteries, and its tip advanced to the same site. The patient is then moved into position on the film changer and the catheter connected to the syringe on the injector chassis. On depressing the hand control, rapid injection at a predetermined rate is achieved. In general, injection rates of 20–30 ml. per second are employed. The accompanying Table illustrates the various injection times which can be achieved by the use of this apparatus.

Quantity of Contrast Medium Injected	Size of Cardiac Catheter	Injection Time in Seconds
70 ml.	10	2
	9	2½
60 „	10	2
	9	2½
50 „	10	1½
	9	2
	8	2½
30 „	10, 9, and 8	1–1½
25 „	10, 9, and 8	1
	7	2
20 „	9, 8, and 7	1–1½
15 „	9 and 8	½
	7	1

The above injection times are obtained with a gauge reading of 90–120 lb. per sq. in. (6·3–8·4 kg. per sq. cm.).

The use of the 50-ml. and 25-ml. syringes facilitates accurate measurement of the smaller doses of contrast medium required in children and infants. Furthermore, the lower bore/stroke ratio and reduced friction of the smaller syringes permit an adequate injection rate even through a No. 7 catheter, which may be the largest that can be employed in the very young patient.

The injector has been used over 350 times at the Middlesex Hospital and the London Chest Hospital for angiocardiography and thoracic aortography. The only untoward incident ascribable to the apparatus was the rupture of an arm vein on three occasions. These accidents were undoubtedly due to incorrect positioning of the metal cannula employed at the time. Such have not been experienced since the metal cannula was replaced by flexible tubing or cardiac catheter.

The advantages of the injector are the provision of rapid safe injection of contrast medium into the chambers of the heart or the great vessels, and simplicity in design and operation. It is cheap to buy and maintain, and has given satisfactory results over the past six years.

The apparatus is manufactured by the Talley Anaesthetic Equipment Ltd., 37a, New Cavendish Street, London, W.1. A succession of registrars and assistants have used the injector, and at their suggestion several modifications have been incorporated in the design.

To-day's Drugs

In this column we publish from time to time authoritative notes on a selection of drugs in current use.

Tenormal (Imperial Chemical Industries Ltd.).
Perolysen (May and Baker Ltd.).

These are preparations of pempidine tartrate (1:2:2:6:6-pentamethylpiperidine hydrogen tartrate) in tablets of 5 and 10 mg. Pempidine is a tertiary amine which lowers blood pressure by ganglion blockade. When given by mouth it is freely absorbed from the gut, and diffuses easily into tissues, readily crossing the blood–brain barrier. It thus closely resembles mecamylamine in its action, the most important difference being its quicker excretion. Thus, in contrast to mecamylamine, which is slowly excreted, acts for up to 12 hours, and is administered twice daily, pempidine acts for 6 hours and is usually given four times daily. The hypotensive action is usually observed within an hour.

Pempidine may prove to be an improvement on mecamylamine, for all the drug in the plasma is active, in contrast to mecamylamine, 25% of which is bound to plasma protein. Furthermore, the rapid excretion helps to prevent toxic accumulation of the drug. The excretion of both drugs is influenced by urinary *p*H, the clearance being increased in acid urine and decreased in alkaline urine. But variation in excretion is less with pempidine, and its hypotensive effect is therefore less likely to be influenced by changes in acid–base balance than that of mecamylamine.

Treatment may be started with 2.5 mg. orally four times daily, increasing each dose by 2.5 mg. daily until the desired control of blood pressure is achieved. A smooth hypotensive effect throughout the day may be expected. The indications for pempidine are those applicable to ganglion-blocking agents in general—severe, complicated, or malignant hypertension. The same side-effects, such as faintness, nausea, and constipation, must be watched for, though they may be less severe.

N.H.S. basic price: Tenormal and perolysen, 50 5-mg. tabs., 7s. 6d.; 50 10-mg. tabs., 13s. 4d.

Compocillin-V Filmtabs (Abbott Laboratories Ltd.).—These are tablets of the hydrabamine salt of phenoxymethylpenicillin (penicillin V). They are available as 125-mg. tablets (200,000 units) or 250-mg. tablets (400,000 units). The advantage of penicillin V is that it resists destruction by the hydrochloric acid in the stomach, and adequate blood levels can therefore be obtained when it is given by mouth. Further information about penicillin V was given in this column on August 16 (p. 445). It is a convenient means of administering penicillin in cases of infection by organisms sensitive to it.

Peganone (Abbott Laboratories Ltd.).—This is ethotoin (3-ethyl-5-phenylhydantoin) made up in tablets of 500 mg. It is of the same family of chemicals as phenytoin sodium, and is also closely related in its chemical formula to methoin (5-ethyl-3-methyl-5-phenylhydantoin). The hydantoins as a class are fairly well tolerated by mouth, and they have a specific anticonvulsant effect, the nature of which is unknown. Each chemical in this family has different toxic effects, though, apart from rare blood dyscrasias, they have not been severe. The present member of this family has been subjected to an extensive clinical trial; no severe toxic reactions have so far been reported, and it does not appear to have any toxic effects not already encountered in its widely used predecessors. It is likely to be of use for major epilepsy, and for focal attacks, but not for the petit mal of childhood.

N.H.S. basic price: 100 tabs., 26s. 8d.

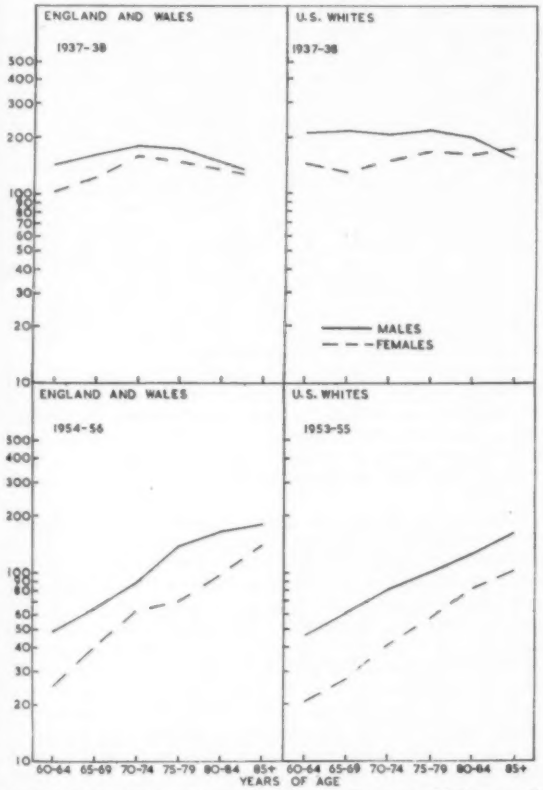
Correspondence

Because of heavy pressure on our space, correspondents are asked to keep their letters short.

Appendicitis in the Aged

Sir,—Dr. Erik Christensen's paper on "Appendicitis in the Aged" (*Journal*, October 4, p. 832) draws attention to this problem. The following observations on its statistical aspects, made as part of a larger study undertaken in this unit, may also be of interest.

Before the 1939–45 war, in both England and Wales and the United States, the reported death rate from appendicitis was no higher in the very old than in late middle-age. To-day in these countries the position is quite different (see Fig.), as the death rate reported for those aged more than 80 is over twice that of those aged 60–64. For example, mortality in women aged 80–84 in England and Wales during 1954–6 was 97 per million; for women aged 60–64 it was 25 per million.



Appendicitis death rates per million. Sources: Volumes of Registrar-General's *Statistical Review of England and Wales* and *Vital Statistics of the United States*

Three possible mechanisms that could have produced this change seem worth consideration. Firstly, there might have been a real change in the disease—either that it now attacks middle-aged people less, or that those currently middle aged have by reason of some feature of their previous experiences a lowered susceptibility to the disease. Secondly, for many diseases recent improvements in treatment have benefited younger rather than older people, and it is possible that the new pattern of the death rate has been produced by this change. Finally, an increased liability to die from appendicitis in old age, compared with middle age, may have existed for a long time; but only now is this being recognized clinically. It is well known that the diagnosis of appendicitis is not always easy. Diagnosis of strangulated hernia in the old is probably less difficult, and it is interesting to find that the death rate from this condition increases sharply with age to-day, and, in contrast with appendicitis, did so before the war.—I am, etc.,

J. A. H. Lee.

M.R.C. Social Medicine Research Unit,
London, E.1.

Dosage of Pancreatin

Sir,—It has come to our notice that general practitioners and others treating children who suffer from cystic fibrosis of the pancreas are finding some difficulty in regard to the dosage of pancreatin. Until recently there were on the market two strengths of pancreatin, standard *B.P.* and triple strength. The dose required of triple-strength pancreatin was as much as 10 g. per meal.

The 1958 edition of the *British Pharmacopoeia* gives a new standard strength which is approximately the equivalent of the triple-strength pancreatin. A new concentrated pancreatin is also available, the equivalent of 15 times the old *B.P.* strength and 5 times the 1958 standard. This concentrated pancreatin is now being widely used. The dose should be about one-third of the dose of the triple-strength pancreatin. Experience shows 0.25 g. with each feed to be sufficient for small babies and up to 2 g. for older children. The cost of the five times concentrated pancreatin is about half the cost of an equivalent dose of the standard strength. In all cases the dose given is determined by the effect on digestion and on the stools. In the case of babies some irritation of the skin of the lips, chin, and buttocks may occur if an excessive dose is given. The taste of the five times strength is much stronger than that of the standard, and for this reason some children are unable to tolerate it. In practice almost all of them become used to it and even develop a liking for it.—We are, etc.,

A. D. M. Jackson.
A. P. Norman.
W. F. Young.

London, W.1.

After Dinner

Sir,—The heart of every reader of your annotation "After Dinner" (*Journal*, October 11, p. 904) must be moved to pity for the habitual guest at annual medical school dinners: most of all, perhaps, for the editors of our medical journals, who have to attend so many but never speak at them. Does this silence express an agreed self-denying ordinance amongst editors, or indicate that their hosts do not realize that men who have an assured command of the written word are, at worse, not less likely to make a good show with the spoken word than some senior whose fame rests upon other things than eloquence or a nice wit?

The apparent poverty of good after-dinner speakers amongst us probably arises from our methods of choice. I do not doubt that there are men and women who can speak the Queen's English with elegance and point, but whom we are never allowed to hear in public. If one may generalize from experience, it seems that the surgeon who has no ideas of his own falls back upon anecdotage when called upon to speak, while the physician, in like plight, takes refuge in compliments and platitudes, thus preserving his cherished respectability, but not redeeming himself from the charge of essential dullness. Of course he gets fewer laughs than the surgeon so easily commands for his idiom. However, few would seriously dispute that the anecdotal sequence as the basis of an after-dinner speech is the last hope of the culturally destitute. A good speech is a work of dramatic art, carefully prepared, and appropriate in form and substance to its end. The speech that wasn't worth preparing can scarcely be worth listening to. Nevertheless, those who attend these dinners to listen or to speak cannot find the situation as intolerable as you suppose. Were it so, old students would not return to them year after year as they do, and men with nothing particular to say and no gift for saying it would not be found to be so universally delighted as they are to be invited to speak. Don't let us waste our

pity. Our audiences don't expect much, and our speakers have a mysterious confidence in their ability to be coherent and amusing without topic or preparation. As you say, Sir, the toast of the guests is always the nadir of after-dinner oratory. It would be a healthy custom if every proposer of this toast who started on the *Who's Who* tack were swiftly and silently removed from the room. Nothing less will save us from these unimaginative bores. Not all spell-binding speakers are cultured, as the politicians have taught us. Yet eloquence is a part of culture. Out of a simple desire to be constructive I suggest that the Royal Colleges might add to their many and varied diplomas a conjoint diploma for eloquence and pith in spoken and written speech. All future officers of these Corporations would of course hold it as a preliminary to becoming eligible for office. Clinical professors and teachers of medicine and surgery would be expected to sit for it as often as might be necessary to gain it, while its possession, though no secret, might be a condition of the grant of a merit award. Such a plan would in a single generation not only resolve the particular situation you so rightly deplore, Sir, but it would transform the medical scene. It would render unnecessary all the dreary debates about medical education by providing a *corps d'élite* of men and women securely possessed of perhaps the most essential weapon in their role as educators: the power to move the hearts and the minds of their students.—I am, etc.,

London, W.1. FRANCIS WALSHE.

Anthrax from Bone Meal

SIR,—I was most interested in your recent annotation on the subject of anthrax from bone meal (*Journal*, October 4, p. 844). You say that human disease is not often traceable to this material. While this may be true for bone meal *per se*, it is less accurate so far as other bone products are concerned. I feel that this statement requires some qualification, because in some parts of this country the association between bone products and human anthrax is well known, and has been so since 1947. Human cases of anthrax due to bone material have received mention in the reports of the Ministry of Health[1 2] and the reports of the Chief Inspector of Factories.[3–6] In 1953 a paper was published by Dr. D. G. Davies and myself on dried bones as a source of anthrax,[7] which reviewed some of the literature on the association of bone products and anthrax in man and animals. We also recorded the occurrence of 14 cases of human anthrax in connexion with a chemical factory using crushed bones as raw material. The crushed bones were imported from the Middle East and from Pakistan. A second paper was published in 1955 on the isolation of *Bacillus anthracis* from imported bones,[8] in which we recorded the isolation of the organism from 5 out of 41 cargoes of imported crushed bone (12.2%). We made the point that this was probably a considerable underestimate of the true figure and gave reasons for this statement. Apart from the isolation of *Bacillus anthracis* from the crushed bones, it has also been isolated from sacks which had previously contained bones. Such sacks have been occasionally incriminated in the spread of anthrax.[6 7]

The second point I should like to make is your reference to the obligatory disinfection of bone. This is not merely a question of economic feasibility. Heat treatment of crushed bones is incompatible with their use as the raw material for gelatin manufacture. Gelatin is a most important export of this country and involves considerable trade with the North American continent. Heat treatment of bone meal does not always result in the destruction even of organisms of the salmonella group, which do not form spores. A treatment sufficient to destroy anthrax may well be very difficult to apply. The difficulties of the task of sterilization of bone products should, of course, not be used to prevent the study of the problem. This is particularly so in view of the fact that this material is also a potential source of salmonella infection. Of 49 samples of crushed bones examined, all have without exception showed the presence of salmonellae. Each specimen contained anything from two to ten serotypes.

Finally, the absence of an efficient sterilization process does not mean that we have no means at our disposal for minimizing anthrax infection due to bones. The number of cases seen has declined since the introduction of more efficient mechanical handling of the raw material in the factory concerned.[3 4] It is only fair to say that the management of the factory have been extremely co-operative in introducing improvements suggested by the authorities. It is perhaps in this approach to the problem that the short-term answer may lie.—I am, etc.,

Cardiff. R. W. S. HARVEY.

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2 Ibid., for Year 1952, 1953, Part II, p. 67.
3 *Annual Report of Chief Inspector of Factories for Year 1950*, 1952, p. 140.
4 Ibid., for Year 1951, 1953, p. 147.
5 Ibid., for Year 1952, 1954, p. 163.
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7 Davies, D. G., and Harvey, R. W. S., *Lancet*, 1953, **2**, 880.
8 —— —— ibid., 1955, **2**, 86.

Reactions after Polio Vaccine

SIR,—I was interested to read the report by Dr. A. Fowden (*Journal*, October 4, p. 835) on a probable reaction to penicillin in poliomyelitis vaccine, and your annotation (p. 843). With increasing use of the vaccine, problems of this sort may be frequently encountered; and several difficulties arise in their assessment. Reactions may occur not only to penicillin or streptomycin but to other substances in the material—for example, the other antibiotics occasionally present, various proteins and formaldehyde, etc. When reactions are seen in patients who have no history of having had penicillin, or of being sensitive to it, are these to be regarded as irrelevant, or as reactions to the other substances? When they occur after the first injection the second is often withheld and, ironically, uncertainty is perpetuated. This point is shown in many of the American papers on the subject, few clearly showing the responsibility of penicillin as does that of Zimmerman.[1]

We saw recently a child who developed an unusual rash a few days after the first injection. There was no history of sensitivity to penicillin. Intradermal tests to the British and to the Salk vaccine and to penicillin and streptomycin were negative, and the second injection was given after the situation had been explained to her mother; there were no ill effects.

There is at present no simple answer to the problem. Some writers have advocated desensitization if sensitivity is suspected or shown; many would doubt the virtue of this, when the chances of producing lupus erythematosus and related disorders in this way have been stressed. Intradermal tests are unreliable. The relative risks must be balanced in deciding whether or not to give a second injection. In considering the matter in a patient known to react to penicillin, it may be noted that Stroud *et al.*[2] say that most of these people have been safely vaccinated. It would probably help if a careful descriptive record were to be kept of all reactions; a general picture might emerge and, at least where the skin alone is involved, the irrelevant coincidental rashes of impetigo, scabies, and the like excluded.—I am, etc.,

London, E.1. C. M. RIDLEY.

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2 Stroud, G. M., Brodell, H. L., Lascheid, W. P., Potts, L. W., ibid., 1958, **166**, 251.

SIR,—During the past few weeks I have seen three cases of sulpha-drug reaction; one of these occurring in an adult and two in children. All had previously been treated with the drug and had suffered no ill effects. On investigation a coincidental factor was shown to be a recent poliomyelitis vaccination, the children having had Salk and the adult the British vaccine.

Case 1.—A girl of 6 was seen at the evening surgery with a recurrence of her frequent sore throats. She was given her

usual treatment of sulphadimidine. Half an hour after the initial dose she developed a bronchial spasm, angioneurotic oedema of the face, and an urticarial rash on the body. Intramuscular antihistamine was given, and the following morning she showed a marked improvement. The child had received her second Salk vaccination ten days before.

Case 2.—A lady aged 38 had two injections of the British vaccine a month previous to taking "dosulfin" for an inflamed throat. A few hours later she developed a generalized pruritus and maculo-papular rash. There was some difficulty in swallowing, due to oedema of the soft tissues of the throat, and some puffiness of the face was evident. Antihistamines were given, but it was a full week before the swelling of the face subsided.

Case 3.—A male child aged 3 had been vaccinated against poliomyelitis in February, 1958, with Salk vaccine. Two months later he was given sulphadimidine for an upper respiratory tract infection. In the evening he developed an urticaria and bronchial spasm. An antihistamine cleared the rash within 24 hours.

It would be interesting to discover whether other practitioners have had a similar experience and whether there is reason to suspect cross-sensitization.—I am, etc.,

Bradford, 7. J. SAMUEL.

Immunization Card

SIR,—With the increase in the number of diseases for which immunization is available it has become almost impossible for the average man or woman to remember or perhaps even to understand what they or their children have been protected against. The situation would not be so serious if the family doctor had a complete record, but unfortunately this is impossible as so many protective inoculations and vaccinations have been carried out in the public health clinics, H.M. Forces, etc., and these records are not easily available. Further, the general practitioner has not suitable place on the N.H.S. medical record card to register the immunizations in tabular form.

For some years now in this partnership we have stamped the table illustrated below on the back of forms E.C.5 and 6 (the medical record envelopes), and have recorded on it all

Sensitivities

BLOOD GROUP		Rh.			
	Diphtheria	Pertussis	Tetanus	T.A.B.	Smallpox
1st					
2nd					
3rd					
Boost					
Boost					

Mantoux	B.C.G.	Other Inocs.
M.M.R.		

our own findings and immunizations and those that have been notified to us; as a result of recent developments a column for poliomyelitis is now required on the stamp. But this does not help us as much as we had hoped, as only a few immunizations are notified to us by the public health authorities and none by H.M. Forces.

It seems to us that family doctors should be made aware of all immunizations carried out on their patients, and that the patient's medical card should be provided with some such table as is used in this practice. Public health authorities should be required periodically to notify general practitioners of protective inoculations carried out under public health auspices. On discharge from H.M. Forces notification could perhaps be done by amending form E.C.13 so that the clerk could copy the inoculation record from the man's paybook on to a portion of the form which the general practitioner could detach and retain. We feel that it is important to start some such arrangements soon, before routine immunization procedures multiply further. Vaccinia and B.C.G. scars can be confused, and, as many people react severely to A.T.S., it can be most important to know urgently the patient's state of immunization to tetanus, and helpful to know about diphtheria, whooping-cough, poliomyelitis, and enteric fevers also.

We have submitted these suggestions to our local medical committee and our medical officer of health. We would be interested to hear if any such scheme exists in another area.—We are, etc.,

P. J. K. FERGUSON.
I. R. W. ALEXANDER.
Edinburgh, 7. M. PATERSON.

Premonition of Death

SIR,—I should like to add a further case of premonition of death to those already given (*Journal*, October 11, p. 914). This took place in a ward of tuberculous patients, all of them from a particular area of Glasgow. During their enforced association within the confines of the ward, these patients, already bound by strong subcultural ties, naturally developed particularly intense relationships with each other. The patient concerned had, however, been partially separated from his fellows for many weeks by screens, since he was clearly dying and subject to rather frequent and distressing haemoptyses. Day and night about, each change of duty among the nursing staff carried with it the expectation of this man's death before the resumption of duty, and each return to duty brought renewed surprise at his continuing existence. His bed, I remember, lay in a corner at the end of the ward farthest from the door, and on the night of his death, and on that night only, this man called from behind his screen, in turn, correctly, bed by bed around the ward, the name of each of his fellows, most of whom he had not seen for months. To each he wished good night, and one who was already asleep drew the comment, "Aye, Lachlan, ye old bugger, ye're aye sleepin'." If this farewell was coincidental, it was certainly striking.

Many of the men of this ward came to a premature and lingering end, and a large proportion of them had full insight extending over long periods of time. Close association with such a community is not lightly forgotten. Beigler[1] has reviewed various ways in which organic disease can be detected from psychiatric and psychoanalytic evidence, and presents case histories in which this knowledge has been applied to diagnosis of impending death not indicated on ordinary clinical grounds. Sandford[2] has also contributed relevant notes on a dying patient.—I am, etc.,

Broxburn, West Lothian. J. B. COLLINSON.

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SIR,—A mother came to me worried about her daughter, aged 4 years. Her daughter told her that she was going to leave her, but she was not to worry because she was going to a very beautiful place. Her mother greatly scolded her and said, "Darling, how unhappy I would be if you left me; how unhappy we would both be." To which the child replied, "I shall be able to see you, but you will not be able to see me."

This was repeated over a number of days. The child was healthy, full of buoyancy—both physically and mentally—normally alert and pyschologically normal.

After a short period of days—I cannot remember exactly, perhaps a week to a fortnight—the child suddenly developed acute meningitis and died in a few days. This was before the advent of antibiotics.—I am, etc.,

Worthing, Sussex. J. C. JONES.

SIR,—I well remember, when I was resident medical officer at the Royal Albert Dock Hospital, the uncanny experience of seeing some of the seriously ill Lascars stripping off their night attire and saying, "Me die, Sahib." Sure enough that night they died, in spite of all we tried to do to save the poor creatures.—I am, etc.,

Thornton Heath, Surrey. DOUGLAS BENTON.

Medical Education

Sir,—Dr. Hugh Gainsborough's letter (*Journal*, September 27, p. 795) is of particular interest to medical social workers and will encourage them greatly, since his conception of medicine as "a study of all aspects of man as he lives in society" comes very close to the ideal which social workers set before themselves. How wonderful it would be if from the beginning of their clinical course medical students were expected to concern themselves with people, their home background, family worries, and anxieties about hospital treatment.

I wonder, however, if Dr. Gainsborough is not expecting too much of human nature in suggesting that the specialists concerned are necessarily the people best qualified to teach what the attitudes aroused by particular forms of treatment are likely to be. Some very great physicians can do this; but perhaps most of us, when we have to carry out painful or humiliating procedures on others, cannot afford to think too deeply how the patient feels about it. We have to concentrate our attention rather on the ultimate benefit to the patient and on developing the most efficient and swiftest method of achieving this end. Moreover, even if ward rounds were more generally organized in such a way as to give patients the opportunity of a quiet talk with their consultant, I am not sure how free they would feel to tell of their fears. They know usually that the surgeon is doing what he considers necessary for their health, and the stiff upper lip seems the most courteous and helpful attitude to take with him.

In whom, then, is the patient most likely to confide about the things that are troubling him? Certainly in the general practitioner if he is already a trusted friend, and sometimes in a sympathetic and not too busy member of the hospital team. But in hospital the person to whom some patients talk most easily is the almoner. It takes a special skill to encourage people to talk freely about intimate fears which they may expect others to think ridiculous; it takes enormous patience and understanding to discover what is the significance of a particular operation for a particular patient, and it requires a conviction that there is value for the patient in talking about these things rather than in fighting them by himself. Moreover, from the patient's point of view the almoner stands a little apart from the rest of the hospital team and has less power over him. It is often through their understanding and support that almoners make their main contribution to the patient's recovery. I wonder, too, if medical schools might not use them more often than they have done in the past as sensitive instruments able to register and demonstrate to students the responses of their patients to hospital experience.—I am, etc.,

London, N.W.3. Isabel Boag,
Almoner.

Sir,—The articles written on general practice and medical education (*Journal*, September 6, p. 577) seem to reflect a disquiet on this subject which springs, I feel, from a general experience that the training which we acquire at medical school and hospital is designed to produce hospital specialists rather than general practitioners. In fact, the majority of medical students do eventually become general practitioners. The staff of a hospital is becoming increasingly a body of specialists rather than people who have a wide medical experience, and many deplore the passing of the general hospital consultant. Further, his place is surely now taken by the general practitioner, who is, in fact, treating many of the conditions that required hospitalization in the past. It is precisely this elevation of status of the general practitioner that seems to be missing from the proposals made in the articles on medical education.

I suggest that the general practitioner needs to be reintegrated not only with local but also with the teaching hospital staffs; that he has an important part to play in the training of students, and that, as a general practitioner, he should be a member of the hospital staffs, not doing sessions in hospital as a consultant but still working as a general practitioner. Because of the nature of medical students and their concern to pass examinations, as a first step the general practitioner should, I believe, be an integral part of the final examinations board. He should be present all along the line, both at the setting of questions, their marking, and at the vivas. I feel that to suggest less than this will have little effect on the present situation.

Because of the present relationship between general practice and the hospital services, and, in particular, what Dr. M. Balint calls "the perpetuation of the teacher-pupil relationship," it would probably be better for the general practitioner if such posts were chosen from an agreed panel drawn up by some qualified body such as the College of General Practitioners. This would obviate, to some degree, the appointment of unsuitable people who sometimes tend to be overawed in the atmosphere of hospital medicine.

Clearly a fundamental change is necessary in medical education, but, in the present set-up, I believe this proposal would be a first step. Suggestions of students visiting general practice for a fortnight, while admirable in themselves, have in fact been attempted for some time with little response; and until, I feel, the examination question is faced, not by some question being asked which would seem appropriate to general practice, but by shift of emphasis on the sort of answers that are required, little satisfactory progress will be made.—I am, etc.,

Orpington, Kent. P. A. L. Chapple.

"Sytron"

Sir,—We have seen your note on "sytron" (*Journal*, August 30, p. 562) and also Mr. C. Beaven's letter (*Journal*, September 27, p. 801) regarding this preparation of sodium ironedetate. In the last two or three years we have been trying out iron chelate substances in the treatment of iron-deficiency anaemia. Among those we have used is sodium ironedetate in two preparations—(*a*) a solution of the chelate suitably flavoured, and (*b*) capsules containing the chelate as a powder. In each case the dosage employed was 70 mg. of elemental iron three times a day. The liquid was given to 55 patients and the capsules to 26 patients, making a total of 81 cases. Diarrhoea occurred in 23 cases and was moderate or severe in 20 cases. Though it sometimes settled gradually, this was not always the case and it was indeed a major disadvantage. There was a minority of patients in whom severe constipation was improved. Nocturnal cramps in the legs also occurred in 16 cases but did not usually commence until nearly four weeks after the start of treatment.

Before a new preparation of iron is introduced there should be no doubt that it either has less tendency to produce unpleasant side-effects or is a better haematinic in view of the many satisfactory preparations available. This preparation was unsatisfactory in the former respect and had no special value from the latter point of view. As it was colourless and almost tasteless it was felt that it might have a limited place as a liquid preparation, but was certainly not suitable for large-scale therapy. We are reporting this work in detail at a later date.—We are, etc.,

John F. Wilkinson.
Manchester, 13. J. T. Leeming.

"Nilergex"

Sir,—In their recent letters Dr. A. Fry (*Journal*, September 6, p. 636) and Dr. R. P. Warin (*Journal*, October 4, p. 859) are critical of the claim that "nilergex" has a very low incidence of side-effects. The former bases his criticism on one case, but Dr. Warin reports 6 cases of drowsiness out of 13 patients given the drug. Their figures compare very unfavourably with those reported from America (5 out of 602 patients). I have used nilergex for the past eight months and have been impressed by the relative absence of side-effects. I have made careful inquiry about these from every patient because of the American claim.

In a preliminary survey of a series of cases intended for later publication, 67 cases have data available with regard to side-effects. A considerable further number are not included because

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of as yet insufficient information. The accompanying Table shows the frequency of these effects in relation to the dosage given.

Doses as high as 72 mg. daily have been given, which are considerably higher than recommended by the manufacturers. In no cases were the side-effects severe. The figures shown for side-effects give an exaggerated impression of toxicity. Examination of the eight cases exhibiting drowsiness revealed that the case on 72 mg. daily had no drowsiness on 48 mg. daily. The same applied to one of the two cases on 60 mg. daily. The case on 48 mg. daily was only drowsy for a few days, she was equally drowsy the following week on dummy tablets, and when nilergex was restarted at the same dose level there was no drowsiness. One case on 36 mg. daily had only very slight sleepiness.

Dosage mg.	No. of Cases	Drowsiness	Other Side-effects	No Side-effects
72	5	1	?1	3
60	2	2	0	0
48	30	1	2	27
36	6	2	0	4
24	9	0	0	9
16	3	2	0	1
12 or less	12	0	1	11
Total ..	67	8	4	55

This leaves 4 cases out of 67 (6%) with definite drowsiness. I have the clinical impression that this was not as marked as with certain other antihistamines. Only two patients volunteered the information that the tablets made them feel sleepy. On the other hand one patient was emphatic that nilergex gave her a feeling of greatly increased energy. Two patients had attacks of asthma whilst taking nilergex, but these were probably not directly attributable to the drug, as they subsided without its withdrawal. One child was sick with the syrup. Another patient complained of a sensation of burning in the oral and nasal mucosa whilst taking nilergex.

Without going into the merits of nilergex as an antihistamine my series shows that it is a drug with noticeable freedom from side-effects—in particular, drowsiness. In this respect I find it as good as any other antihistamine and better than most. The absence of a sedative effect is not always essential in these drugs but of great value in those driving vehicles or working with machinery.—I am, etc.,

Glasgow J. O'D. ALEXANDER.

Chemotherapy in Primary Pulmonary Tuberculosis

SIR,—I would like to thank Dr. J. K. Cameron, Professor J. D. Hay, and Mr. L. J. Temple (*Journal*, May 31, p. 1301) for replying to my letter (*Journal*, April 12, p. 887) and for clarifying their conclusions concerning the value of "antibiotics" in the treatment of primary pulmonary tuberculosis. Unfortunately it appears that the main point in my letter has escaped them. This was simply that in every case of active tuberculosis, child or adult, an effort should be made to rid them of their tubercle bacilli in order not only to prevent spread of disease and possible complications such as meningitis and bone and joint involvement, but also to minimize relapse at a later age.

Dr. Cameron, Professor Hay, and Mr. Temple raise several questions in their recent letter which I feel require answering: (1) The development of drug resistance: I cannot see the pertinence of this matter to a decision to give chemotherapy or not—but if chemotherapy is commenced, the chances of drug resistance developing are increased by giving ineffective doses. Therefore adequate treatment must be given. (2) The patient's own resistance in combating disease: I agree that this is a very significant factor in every case of tuberculosis. In a percentage of patients, however, this is not sufficient and complications and later relapse do occur—it is to prevent such occurrences, in every case if possible, that chemotherapy is recommended. (3) Is every child who converts a Mantoux test to be treated? If recent, I would again say yes, as a preventive measure. (4) Toxic side-effects of chemotherapy: There is no doubt that this danger exists and must be weighed against the possible good advantages of treatment. I feel that with careful management these can be kept to a minimum and that children should not be denied adequate treatment because of a possibility that they might appear.

One should remember that every child sterilized of tuberculosis germs, apart from being cured himself, may save many others from being subsequently infected with tuberculosis.—I am, etc.,

Adelaide, S. Australia. R. MUNRO FORD.

Thoracic Outlet Compression Syndrome

SIR,—In their paper in the *Journal* of September 20 (p. 709), Professor C. G. Rob and Mr. A. Standeven contend that the changes which they observed in the arms were due to local mural thrombosis of the subclavian artery followed by embolism or spreading thrombosis, and that this local thrombosis was due to extrinsic pressure in the region of the first rib. The evidence for the second of these propositions was the presence of a cervical or abnormal first rib, the presence of a systolic murmur in some of the cases, and the improvement which followed removal of the abnormal structure.

Some recent cases have made us doubtful whether this evidence is sufficient, at least in those over 40 years of age. As mentioned in the article, symptomless cervical ribs are common enough; systolic murmurs and thrills due to a stricture anywhere between the aortic valve and the supraclavicular fossa may best be detected at the latter site; and the improvement following surgery is unconvincing evidence of the cause, as sympathectomy was performed in each case and Case 4 was improved although the suspected rib was not removed and the artery damaged and repaired. The following cases have all been studied recently.

Case 1.—A sales manager aged 42 had experienced pain in the left arm for several weeks when he was aged 38 and again at 41 and had had coronary thrombosis at ages 37 and 41. He had impaired pulsation in the left subclavian and distal arteries with a coarse thrill and murmur in the left supraclavicular fossa. The blood pressure was 170/70 and 90/70 in the right and left arms respectively. Carotid pulsations were equal. Arteriography (see Figure) demonstrated narrowing of the subclavian artery between the origin of the vertebral artery and the thyroid axis.

Case 2.—A clerk of 58 was aware of a hissing noise coincident with the pulse. He had both effort angina and intermittent claudication. The physical signs were similar to those of Case 1, the blood pressure was 165/85 and 140/110 in right and left arms. Aortography revealed constriction of the left subclavian just above the origin of the vertebral artery.

Case 3.—A butcher aged 64 became dizzy on bending his head forwards and developed intermittent claudication in the right arm when splitting carcases. He had gross impairment of pulsation in the right carotid artery with diminished pulsation in the right subclavian artery and a marked systolic thrill and murmur in the right supraclavicular fossa. Blood pressure was 105/90 and 165/85 in the right and left arms. At aortography the innominate artery was shown to be markedly narrowed 2 cm. from its origin.

Case 4.—A farm labourer aged 64 developed occipital headache whenever he slept on his left side, rapidly relieved by standing. The physical signs were similar to Case 3. The blood pressure was 135/105 and 210/105 in the right and left arms. This lesion is evidently in the innominate artery, but arteriography has not yet been performed.

This group all had evidence of arterial narrowing anatomically unrelated to the first rib and had no structural abnormality in the neck, but in each the thrill and murmur were best appreciated in the supraclavicular fossa. Had a cervical rib been found it would have provided a ready explanation for partial occlusion of the subclavian artery. Aortography and subclavian arteriography were performed by retrograde passage of a catheter following percutaneous puncture of a femoral artery, an investigation which we have found safe and of great value in establishing an exact diagnosis. We suggest that it would be wise to exclude other lesions of the subclavian artery before accepting pressure by a cervical or abnormal first rib as the cause of a patient's symptoms.—We are, etc.,

J. R. H. TOWERS. C. P. NEWCOMBE.
Leeds. P. G. KEATES. M. D. SUMERLING.

Pathogenesis of Fever

SIR,—Your review of the pathogenesis of fever in rabbits (*Journal*, October 4, p. 839) is timely in view of the important discoveries now being made in this field, but there is a regrettable omission of any reference to the British publications which are the only studies of man. It has been shown that the latent period in the action of bacterial pyrogen is greatly reduced if it is incubated *in vitro* in fresh human blood before injection.[1] The presence of a minimal number of leukocytes, probably polymorphs, in the blood is necessary for this property to be achieved.[2] Incubation of bacterial pyrogen in cell-free plasma or serum conversely inhibits the febrile response,[3] and in this important respect man differs from the rabbit, in whom a similar preparation produces an accelerated and augmented fever.

We postulated that human endogenous pyrogen is produced by the *in vitro* incubation of leukocytes with bacterial pyrogen, and the properties of this substance were examined.[4] Human endogenous pyrogen fails to pass an ultra-filter or a dialysing membrane, and unlike bacterial pyrogen is destroyed by heating to 70° C. for thirty minutes. In addition to the difference in latent periods, bacterial pyrogen fails to produce fever when injected intramuscularly, whereas endogenous pyrogen does so, and the repeated injection of endogenous pyrogen does not lead to tolerance. Endogenous pyrogen was present in the blood of a patient who had been previously injected with bacterial pyrogen.

So far we have failed to produce human endogenous pyrogen from human leukocytes alone, and it remains to be determined if this substance is released from white cells or whether the properties attributed to it are due to an alteration of chemical structure of bacterial pyrogen (lipopolysaccharide) by some action of leukocytes. In view of the different properties of human and rabbit serum, the results of animal experiments must for the present be carefully distinguished from the evidence derived from man. For this reason alone it is unfortunate that your annotator omitted to mention the human work.—I am, etc.,

London, W.2. E. S. SNELL.

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Ergometrine with Hyaluronidase

SIR,—I was most interested to read the paper by Drs. M. P. Embrey and W. J. Garrett (*Journal*, July 19, p. 138) and the letter by Dr. A. H. Labrum (*Journal*, October 4, p. 857) on the speed of action of ergometrine in conjunction with hyaluronidase. As a woman can lose a serious amount of blood even in the 4–6 minutes before the onset of the action of ergometrine accelerated by hyaluronidase, would it not be safer—and cheaper—to employ routine intravenous ergometrine at the end of the third stage? I would suggest that the injection—of 0.25 mg. intravenously and 0.25 mg. intramuscularly—be given *after* the delivery of the placenta to avoid its retention.—I am, etc.,

Drayton, Norfolk. J. N. GALE.

The Peacehaven Syndrome

SIR,—I see every year a condition which I call the Peacehaven syndrome. The patient, let us call him Joe Murgatroyd, is from up North and is around the retiring age. He has been rather short of breath over the past few years and decides to buy a bungalow and retire to the South Coast to help his bronchitis.

When the move comes, his wife goes on ahead by train to get some food in, while Joe goes with the van to see that the furniture does not go astray. Joe usually gives the van-driver a beer on the road and has one or two himself. That night he is taken ill and is sent into hospital with what is called acute bronchitis. When he comes in, his bladder is up to the umbilicus, his blood pressure is sky high, and he is waterlogged. His prostate is enlarged. He is never the same man again, and his disconsolate widow may find herself, a year later, selling the house at a loss and returning to the North where her friends are. The only people who are happy are the house agent and the undertaker.

The moral, of course, is to make sure that you are fit enough before you make a serious change in your way of life.—I am, etc.,

Hove. FORDE CAYLEY.

The Pharmaceutical Industry

SIR,—Among the criticisms of the pharmaceutical industry Dr. R. S. Inch (*Journal*, October 4, p. 846) makes no mention of the confusion, annoyance, and waste of time caused by the existence of several names for the same drug. In recent years new drugs with proprietary names such as "dindevan," "achromycin," "inversine," or "equanil" have been announced with a barrage of propaganda from the manufacturers. Later we have read articles in medical journals about phenindione, tetracycline, mecamylamine, or meprobamate, and have been subjected to more propaganda from other firms about the same drugs under other proprietary names, such as "tetracyn" or "miltown." According to the *British National Formulary* prednisolone has the following proprietary names: "codelcortone," "delta cortef," "delta cortril," "delta-stab," "di-adreson-F," "hydrodeltalone," and "precortisyl." Sulphanilamide was said to have over 40 proprietary names.

Unlike many of the other problems mentioned by Dr. Inch this one is capable of solution. If the pharmaceutical industry, in association with the General Medical Council, cannot solve it, I would favour legislation to ensure that one drug has one name.—I am, etc.,

Farnham, Surrey. J. W. TODD.

Homosexuality

SIR,—Dr. Desmond Curran's review of four books on this subject (*Journal*, October 4, p. 837) is one of the ablest and most helpful I have read—on any topic. Far from being "ill-chosen asides," as implied by Dr. W. A. O'Connor (*Journal*, October 18, p. 979), Dr. Curran's criticisms are precisely the sort of comment that is really useful to a potential book-buyer; and his concluding suggestion of a truly informative book is exactly what the reader needs.—I am, etc.,

Manchester. RAYMOND WHITEHEAD.

∴ This correspondence is now closed.—ED., *B.M.J.*

Obituary

HENRY WALLACE-JONES, M.Sc., M.D. F.R.C.P.

Dr. Henry Wallace-Jones, formerly senior honorary physician and physician in charge of the department of cardiology at Liverpool Royal Infirmary, died suddenly at Johannesburg, South Africa, on October 8. He was 70 years of age.

Henry Wallace-Jones was born in Liverpool on August 1, 1888, the son of Dr. Henry Jones, and was educated at University College, Liverpool, and at Liverpool University, where he graduated first in science. Obtaining the B.Sc., with first-class honours, in 1910, he proceeded to the M.Sc. in the following year. Then, having decided to complete the course in medicine, he went on to take the degrees of M.B., Ch.B. in 1913, again with first-class honours. In 1914 he proceeded to the M.D., and also obtained the now obsolete diploma in ophthalmic surgery (D.Ch.O.). Elected a Member of the Royal College of Physicians of London in 1921—he had taken the London Conjoint diploma in 1912—he became a Fellow of the College in 1930. After taking his medical degrees he held the appointments of house-physician, house-surgeon, and house-surgeon to special departments at Liverpool Royal Infirmary. During the first world war he served as a captain in the R.A.M.C. and was pathologist to the Liverpool Merchants' Hospital in France. After the war he returned to Liverpool to practise as a consulting physician. He became honorary assistant physician at Liverpool Royal Infirmary in 1919, progressing to senior assistant physician, full physician, and ultimately senior physician. From the middle twenties until he retired soon after the end of the second world war he was medical officer in charge of the cardiology department at the Royal Liverpool Children's Hospital, and over much of the same period was head of a similar department at Liverpool Royal Infirmary. He was also consulting cardiologist to Waterloo Hospital and honorary consulting physician to Liverpool Maternity Hospital. He assisted Professor Ernest Glynn in the preparation of the report of the Medical Research Council (Special Report Series No. 79, 1923) on bacteriological and clinical observations on pneumonia and empyemata. In 1924 he contributed a paper to these columns on types of dextrocardia; in 1926 on congenital absence of the pectoral muscles; in 1927 (with Dr. Robert Coope) on the urea concentration test in nephritis and its prognostic value, and (with Professor John Hay) on trauma as a cause of auricular fibrillation, its medico-legal significance; and in 1928 on vital capacity in heart disease. He was the author, jointly with Dr. E. Noble Chamberlain, of *Electrocardiograms: An Elementary Atlas for Students and Practitioners*, a small manual published in 1939. A member of the British Medical Association for forty years, he was honorary secretary of the Liverpool Division from 1928 to 1930. In 1926 the Association awarded him a research grant. He leaves a widow.

G. S. SEED, F.R.C.S., D.L.O.

Mr. G. S. Seed, senior aural surgeon to the General Infirmary at Leeds and to St. James's Hospital, Leeds, died in London on October 13 at the age of 53.

George Sutcliffe Seed was born on April 27, 1905, and was educated at Heath Grammar School, Halifax, and at Leeds University, where he graduated M.B., Ch.B. in 1927. Three years later he obtained the D.L.O. of the English Royal Colleges, and in 1936 was admitted F.R.C.S. After graduation he held the appointments of house-surgeon and house-physician at the West Bromwich and District General Hospital, and senior house-surgeon at the Birmingham and Midland Ear and Throat Hospital. He then returned to Leeds as resident aural officer at the General Infirmary, subsequently becoming aural surgeon to the infirmary and to St. James's Hospital. When the British Medical Association held its Annual Meeting at Harrogate in 1949 he served as a vice-president of the Section of Oto-rhino-laryngology. He leaves a widow and three daughters.

T. McM. B. writes: The privilege of working alongside a man of George Seed's integrity and selflessness is not given to everyone. He was brought up in Halifax, the only child of parents who themselves must have been admirable, for George of all people showed none of those weaknesses which sometimes betray an only child. He was educated at Heath Grammar School, Halifax, and there must have been laid down the foundations of the character which endeared itself to so many. The results of this early education in George's case were a fine example of all that is good in the British educational system. After graduation and the usual hospital appointments he returned to the General Infirmary at Leeds as resident aural officer, a post he held without blemish for seven years, probably a record term of office for any resident appointment in this hospital. It was typical of his assiduity of purpose that, after taking his F.R.C.S., he immediately decided to broaden his experience and knowledge by a prolonged tour of clinics in Zurich, Vienna, Berlin, and Scandinavia. On his return, and when the late E. W. Bain retired, George was the obvious successor, and he was appointed consultant not only to the infirmary but to St. James's Hospital and Dewsbury General Hospital. It was at this time that he first saw an auburn-haired almoner, and I well remember the shyness with which he contrived an introduction to the girl whom he married in 1939. A year or so before this he had joined the Territorial Army and was embodied in September, 1939. He saw service with the British Expeditionary Force in France, before Dunkirk, and later on had over three years in India, where for a period he served as a brigadier in his specialty.

On his return home George was always determined not to work in clinical isolation, and it was his vigour and his inspiration which resulted in the foundation of the North of England Otolaryngological Society. He became its president, and the youthful zest of its activities is a fitting tribute to his memory. He spent and enjoyed a lot of his spare time in clinical discussions, and a measure of the esteem in which his colleagues in many places held him is that he was a member by invitation of the Visiting Association of Ear, Nose, and Throat Surgeons of Great Britain, as well as of the Midland Otolaryngological Club. He had recently been elected a vice-president of the section of otology of the Royal Society of Medicine. It was always a joy to observe the delight with which his colleagues greeted him at the meetings of these societies. He visited clinics in America and, despite a prolonged and serious illness five years ago, continued these activities, and it was during one of these journeys that his life ended. His particular clinical interest was probably in malignant disease. He had written on this and other subjects, but his clinical abilities lay mainly in his thoughful judgment of what was best for the patient rather than indulgence in exciting, probably short-lived, new theories. He was, however, ready to familiarize himself with new techniques, but in our weekly combined clinics a flitting frown of dismay would indicate a firm stand against unorthodox suggestions. Patience was one of his virtues, and despite his heavy commitments he was always an inspiration to the rest of us. His painstaking and unhurried methods in the diagnosis and care of his patients were a fine example to his juniors and students. After his long period of residence and prolonged absence abroad he had revelled in the joys of family life, and it is with gratitude that we know this was a happy one. He had enjoyed fishing in recent years, and very recently had returned from one such holiday in Scotland. His impish sense of fun made him a delightful companion, and his gentle nature a man who was liked by everybody who knew

him, and loved by many. The sympathy of his many friends will be extended to his widow and three daughters in the loss of one who was professionally so mature and yet who still retained his youthful enthusiasm. Perhaps his life can best be summed up by quoting from a letter I received from a mutual friend. He says: "George did as much and more for the infirmary by being selfless, generous, and unassertive as many have done with more aggression; his influence was entirely beneficent."

JANE H. TURNBULL, C.B.E., M.D.

Dr. Jane Turnbull, who died at Canterbury on October 15 at the age of 87, was formerly in charge of the Maternity and Child Welfare Division of the Ministry of Health.

Jane Holland Turnbull was born in 1871, the daughter of Lieutenant-Colonel Archibald Turnbull, of the Indian Army Veterinary Service. Both her parents died in India when she was still a young child. Some of her early education was in Edinburgh, but later she went to live in Reading with a friend of the family who kept a school there and for whom Dr. Turnbull had a great affection. After studying medicine at the London School of Medicine for Women she graduated M.B., B.S. in 1899, with first-class honours in surgery. Five years later she proceeded M.D. After graduation she became a demonstrator of anatomy at the London School of Medicine for Women and then obstetric assistant at the Royal Free Hospital. After a period of work at the East Anglian Sanatorium at Colchester she returned to London as R.M.O. and tutor in obstetrics at the Royal Free, where she did useful work in organizing the district midwifery service. She also began a long association with the Elizabeth Garrett Anderson Hospital (known then as the New Hospital for Women), where, after being house-surgeon and house-physician, she became assistant obstetrician. Another appointment she held was that of assistant surgeon to the Canning Town Medical Mission Hospital. After settling in private practice in 1905, Dr. Turnbull continued to serve the Royal Free Hospital as anaesthetist and lecturer in anaesthetics. An examiner to the Central Midwives Board, in 1913 she was appointed a member of the committee which established the South London Hospital for Women, and later she joined the staff of that hospital as assistant surgeon.

During the first world war Dr. Turnbull became Controller of Medical Services, Queen Mary's Army Auxiliary Corps, and she was appointed C.B.E. for her services in 1918. The Ministry of Health was set up in the following year and she joined its staff as a medical officer. She was chiefly concerned with the maternity and child welfare services and for three years worked as director of the Maternity and Child Welfare Division at the Ministry before her retirement in 1936. Thereafter she continued to make a useful contribution to the development of the work in which she was interested by serving as chairman of the National Association for Maternity and Child Welfare from 1939 to 1948, and for the next three years as vice-president of that association.

We are indebted to Sir Arthur MacNalty for the following appreciation: Dr. Jane Turnbull's death at an advanced age brings to mind many memories. After service at the Royal Free Hospital, on the honorary medical staff of the Elizabeth Garrett Anderson Hospital and the South London Hospital for Women, and as Controller of Medical Services, Queen Mary's Auxiliary Corps, she was appointed a medical officer of the newly established Ministry of Health in 1919. I did not see a great deal of her in her first years at the Ministry, for she was chiefly occupied in the inspection of maternity and child welfare schemes and out of the office, but whenever I conferred with her on official subjects I found her a most helpful and understanding colleague. Her good work was especially valued by her immediate chief, Dame Janet Campbell, to whom she became Deputy Senior Medical Officer in 1929. On Dame Janet's retirement in 1933 Dr. Turnbull was put in charge of the Maternity and Child Welfare Division. She retired in 1936 after three years of excellent and strenuous work as acting S.M.O.

Dr. Turnbull participated in the comprehensive special investigation into maternal mortality in England, the report on which was published as a White Paper in April, 1937. One of the first results of this investigation was an improvement in the standard of midwifery practice, both domiciliary and institutional, through the Midwives Act of 1936. This provided a salaried domiciliary service of trained midwives throughout the country. In the establishing of this service by local authorities Dr. Turnbull's advice and experience were of value both to the Ministry and to medical officers of health. Much of Dr. Turnbull's work was unobtrusive. She succeeded in her aims to improve the well-being of mothers and children by wise administration, because her arguments were logical, tactfully expressed, and in matters of controversy given with appreciation of the other person's point of view.

Dr. Turnbull was of medium height, white-haired, and erect. She was alert and brisk, but reserved in disposition, and a lover of books and of flowers, which she cultivated in her garden at Princes Risborough. She had a dry sense of humour which occasionally revealed itself in the course of conversation. With a strong sense of vocation, she helped to make the world better than she found it, and for this she would wish to be remembered.

E. B. writes: Dr. Jane Turnbull was a Scot by birth, an Anglican by training, and a very gentle, courteous lady. All through her life she always believed the best once she had learned to like and respect anyone. She never made up her mind quickly on important issues, and always sought the help of those whom she knew were trustworthy. She had had her Edinburgh roots severed at too young an age and was never able to forget how gracious the old pre-war type of life had been, and she found it very hard to let people, even in times of emergency, relax the courtesies of life. In her later years she lived with a god-daughter, who helped her through her time in Canterbury Hospital after a fall last summer and a weary time with a fractured hip. But she made a good recovery and was able to be home for some time and enjoy the garden, and it is now from that quiet home that has come the news of her passing. Her gentle courtesy and beauty of early life will be long remembered by all to whom she endeared herself through a long and useful life.

J. K. J. HAWORTH, M.D., M.S.

Mr. J. K. J. Haworth, honorary surgeon to Sutton Hospital, Surrey, and surgeon to the Carshalton and District Hospital, died suddenly at Mullion, Cornwall, on October 4. He was 69 years of age.

James Kenworthy Johnston Haworth was born at Durham on December 9, 1888, the son of Canon Haworth, formerly principal of St. Hild's College, Durham. From Durham School he entered Durham University College of Medicine, going on to the Royal Victoria Infirmary, Newcastle upon Tyne, three years later. He graduated M.B., B.S. from Durham University in 1912 and proceeded to the M.D. in 1914 and the M.S. in 1920. After graduation he held a number of appointments at the Royal Victoria Infirmary, Newcastle upon Tyne, ultimately becoming resident medical officer. In August, 1914, he joined the R.A.M.C., and in October went to Lucknow with the 4th Battalion, Royal West Surrey Regiment. He also served in Egypt, Rangoon, and Mesopotamia, from where he was invalided back to Lucknow in 1916, and was not demobilized until September, 1919. While in India he lectured in anatomy and examined in surgery for Allahabad University. After the war he returned to his Newcastle appointment, but left there to go to Durban, South Africa, but came back to Britain in 1922 to become medical superintendent of St. Mary's Hospital, London. In the following year he was appointed senior assistant medical officer under the old Metropolitan

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Asylums Board at Queen Mary's Hospital for Children, Carshalton, Surrey. Soon afterwards he decided to set up in practice in near-by Sutton, and became honorary medical officer to the Carshalton War Memorial Hospital and honorary surgeon to Sutton and Cheam Hospital. During the second world war he was a surgeon in the Emergency Medical Service. For some years he was an examiner in surgery for the General Nursing Council of England and Wales.

J. M. T. and T. H. W. write: Pat Haworth, as he was affectionately known locally, was interested in people, and felt that general practice was the most satisfying medical work. He began practice in Sutton in 1927, and after such a varied and distinguished professional experience both in this country and abroad the impact of his personality was soon felt. Within a short time he was appointed to the surgical staff of Sutton and Cheam Hospital and to the Carshalton War Memorial Hospital, where he practised surgery with skill not bettered in higher circles. In his work, care and thought for the individual were his chief concerns. There can be few general-practitioner and surgical colleagues in the district of his time who did not benefit from his wise advice and sage counsel. In private practice patients were assured not only of first-class individual attention but also of a degree of human kindliness and interest in their ordinary affairs. Haworth was remarkable because he was both the best type of family doctor and a skilful surgeon. Outside medical practice Pat Haworth had many interests. He was a good listener and yet could talk wisely on most subjects. A keen observer of life in general from nature to politics, he brought a boyish enthusiasm to each new interest and to all that he did. Conversation with him could never be dull or uninteresting; he enjoyed an argument, and one usually left him having learned something. He was outspoken, vigorously supported what he considered ethically correct, and never took a pessimistic view of anything.

A serious illness in 1950 made him retire from active medical practice and curtailed his physical activities, but his agile mind could not be curbed and he decided to read law. With zest and enthusiasm he became a student member of Gray's Inn. Intensely interested in this new sphere, he completed the whole of part I, and was hoping to take part II of the Bar examination, when he passed away. Considerable time in late years was devoted to hospital committee work, where his valued services were in much demand, and he had recently joined the management committee of Long Grove Hospital. Haworth was concerned for the welfare of the nurses at his hospitals and was interested in their training, and had been for many years up to his death an examiner in surgery for the General Nursing Council. He was a past president of the local medical society. Sutton and district is much poorer as the result of his passing, but his memory will live long with us, and in particular with those many patients who have such good cause to remember his kindness and skill.

D. R. CURNOCK, M.R.C.S., L.R.C.P., L.D.S

Dr. D. R. Curnock, who was in dental practice with his brother, Mr. G. L. Curnock, in London for many years, died at his new home at Dorking, Surrey, on August 23. He was 65 years of age.

A. E. S. writes: Reginald Curnock died at Dorking in August a few hours after moving there with his wife from Wanstead, where they had lived for many years. He had been ill intermittently for some years and had to retire early this year. He and his brother carried on their father's dental practice in the City. When they were bombed out in Christopher Street they moved to Wimpole Street. Reginald had a large and devoted following. His great interests outside his work were Methodism and archaeology. His grandfather led the singing in the Methodist Conference. His father's cousin, the Rev. Nehemiah Curnock, discovered the key to the cipher of John Wesley's *Journal*. Hymn tunes and Wesley's hymns were an endless delight to Reginald. In illness he always came up smiling and optimistic. His conversational powers never waned. One of his sons (Henry) is a doctor.

J. W. MURDOCH, M.B., Ch.B.

Dr. J. W. Murdoch, general superintendent of the mental hospitals in the State of North Carolina, U.S.A., died on September 16 at the Memorial Hospital, Chapel Hill, North Carolina. He was 58 years of age.

James Wilson Murdoch was born at Stonehaven, Kincardineshire, in 1900, and was educated at Aberdeen University, where he graduated M.B., Ch.B. in 1924. After graduation he held appointments at Inverness District Asylum and the Devon Mental Hospital, Exminster, before entering the Colonial Medical Service in 1928. Posted to Malaya, he was appointed second assistant medical superintendent of the Central Mental Hospital at Tanjong Rambutan, in Perak, later becoming medical superintendent. He left the Colonial Medical Service in 1941, and took up an appointment at the Hospital for the Insane, Claremont, Western Australia, returning to Britain at the end of the second world war. In 1947 he became superintendent of the newly opened Butner State Hospital in North Carolina, and three years ago was appointed head of all the mental institutions in the state. While at the Butner State Hospital he worked hard for reforms in the treatment of mental patients, and introduced a method of voluntary admission. He insisted that all patients, including those who were receiving custodial care, should have medical treatment. After he became general superintendent of the mental hospitals in North Carolina he extended the system to include all mental institutions. His profound sympathy for and understanding of the needs of the mentally ill were such that before very long he was able to introduce more humane methods of treatment. He lived to enjoy a good measure of support for his ideas from his colleagues and others interested in the problem. Soft of speech, he had a very likable manner which endeared him to all. By his death the State of North Carolina has lost a valuable member of the community and his patients a steadfast friend. He leaves a widow and one daughter.

A. McWATT GREEN, M.B., Ch.B.

Dr. A. McWatt Green, who was in general practice at Bo'ness, West Lothian, died suddenly on September 21. He was 43 years of age.

Alexander McWatt Green was born on May 28, 1915, in Bo'ness, though his early years were spent in India. After the family had returned to this country, he was educated first at Glasgow High School and thence at Glasgow University, where he graduated M.B., Ch.B. in 1939. In that year he joined the Royal Navy, and saw action in many parts of the world. He was a lieutenant-commander, R.N.V.R., at the end of the war, when he left the Service to enter practice with the late Dr. W. A. Shafto.

C. D. L. writes: Dr. A. McWatt Green packed much into his short life. He was a true general practitioner, with an inexhaustible liking for people and an extraordinary memory. He was an active member of the Edinburgh Obstetrical and Medico-Chirurgical societies. His well-informed clinical acumen was always thoroughly seasoned with kindly common sense. Each patient became a personal friend, and, although as a consequence Dr. McWatt Green's time was so little his own, he was incapable of saying an unkind word to anyone. His interests were many. For years he played Rugby football with distinction. He was a keen sailor and was vice-commodore of the Upper Forth sailing club. He somehow found time for a little fishing, golfing, swimming,

tennis, painting, fast motoring, and playing the pipes. Of course it was as a family man that he was happiest, and we like to remember him either as the superb raconteur, with his pipe, or else dashing about with his wife in the open car, with three boys and the poodle hanging over the back. His patients in innumerable households have lost a well-loved family friend. His many friends and colleagues mourn his loss, but are the richer for having known him and his example of imperturbable good nature and zest for life. We join in sympathy with his widow, his mother, and his sons in their tragedy.

H. B. LOW, *M.C.*, T.D., M.D.

Dr. H. B. Low, consulting physician to Sunderland Royal Infirmary, died at his home at Clovenfords, Galashiels, on September 29. He was 73 years of age.

Herbert Bruce Low was born at Sunderland on January 8, 1885, the son of Dr. Alexander Bruce Low, and was educated at Uppingham. Entering Edinburgh University as a medical student in 1902, he graduated M.B., Ch.B. in 1907. Four years later he proceeded to the M.D., receiving a high commendation for a thesis on poliomyelitis. After graduation he held the appointments of junior house-surgeon and house-physician at Sunderland Royal Infirmary and assistant house-physician at Bristol General Hospital, returning to Edinburgh to become house-physician at the Royal Hospital for Sick Children under the great John Thompson. Early in 1914 he took over his father's practice in Sunderland, where he became honorary physician to the Children's Hospital. On the outbreak of the first world war he was called up in the Special Reserve, because as a student he had held a commission in the infantry, but he was quickly transferred to the R.A.M.C. Going to France in 1915 with the first 100,000, he had a distinguished Army career, being awarded the Military Cross (in 1917) and Bar and three times mentioned in dispatches. In 1923 he was awarded the Territorial Decoration. He resumed his practice in Sunderland immediately after the war, and was soon appointed honorary physician to the Royal Infirmary. A member of the British Medical Association for 55 years, he was chairman of the Sunderland Division in 1936–7. In 1934 he was elected president of the Newcastle upon Tyne and Northern Counties Medical Society.

W. G. W. writes: Herbert Low's approach to medicine was a combination of an intensity of purpose with a sincere concern for the patient. Some may have thought him somewhat pragmatical, but this apparent attitude was merely an expression of his desire to eliminate slipshod judgment and flashy diagnosis. The confidence his patients had in him was outstanding. Outside his profession his interests lay in his family and his church. His faith was profound and pervading, but not obtrusive, and he was an ardent supporter of the Presbyterian church in Sunderland, of which he was an elder. On his retirement he became a staunch supporter and elder of the church at Caddenfoot, and a striking tribute, beautifully written, has been paid to him by the minister there. H. B. L. did not make friends readily, but those who enjoyed his friendship were the more proud of it. His hobbies were hill-climbing, and, later, photography and antiquarian lore of the Border country. During his student days he held an infantry commission in the Queen's Edinburgh company of the Royal Scots. At that time I was a private in the Volunteer company of the R.A.M.C. We went on combined route marches and our company was certainly less efficient than the "All Blacks." Doubtless we thoroughly deserved the dressing-down from the somewhat austere H. B. L., when he told us that we ought to be proud to be stretcher-bearers to a company of the oldest regiment in Great Britain. He was twice married, and to his widow and three daughters we extend our sincerest sympathy in their loss. They will retain the fragrance of endearing memory of a life of devotion well spent.

MARY TURTON, M.D., D.P.H.

Dr. Mary Turton, formerly senior pathologist in Uganda in the Colonial Medical Service, died at Cape Town, South Africa, on October 9.

Mary Martin was born in 1889, the eldest daughter of the Rev. Robert Martin, of Seymour, South Africa, and studied medicine at Edinburgh University, graduating M.B., Ch.B. in 1915. After graduation she held the appointments of house-surgeon and senior resident medical officer at the North Staffordshire Royal Infirmary and house-surgeon at the Golden Square Throat, Nose, and Ear Hospital, London. Serving in the first world war from 1916 to 1920, she was for some time an ear, nose, and throat specialist attached to the R.A.M.C. in Malta, and later served in Egypt. After demobilization she was a medical officer at the Royal Herbert Hospital, Woolwich, and in 1921 took both the D.P.H. and the D.T.M.&H. of the English Royal Colleges. In that year she entered the Colonial Medical Service and went to Uganda as assistant bacteriologist. Five years later she was promoted senior bacteriologist, a title which was subsequently changed to that of senior pathologist, and held the post until she retired from the service in 1937. While in Uganda she proceeded to the M.D. in 1930 and studied law, being called to the Bar by the Inner Temple; and it was while in the Colonial Medical Service that she married. On the outbreak of the second world war she offered her services to the Government and held temporary appointments, first, under the Essex County Council, and, later, in the Ministry of Pensions. After the war she returned to South Africa.

CHRISTINE M. STACEY, M.B., B.S.
M.R.C.O.G., M.M.S.A.

The obituary of Dr. Christine M. Stacey was printed in the *Journal* of September 20 (p. 748).

Dr. Elizabeth Gourlay writes: As a friend who had known her for many years, from the time of her resident days at the Royal Northern Hospital and through the years in which she worked at the South London Hospital, I should like to add a few words to the appreciation which has already been written. Christine Stacey had a great many gifts. Her striking good looks and attractive personality, together with a very lovable disposition, made her a most delightful companion. Her very great clinical abilities were coupled with an unusually keen appreciation of the patients' needs and point of view. Many of those whom she taught will remember things which she told them, not in the text-book but only too true. She was always so willing to help, no matter what personal trouble the undertaking might give her, and there will be many amongst her friends, colleagues, and patients who will not forget the work which she did for them so skilfully and willingly.

J. W. BROWN, M.D., F.R.C.P.

The obituary of Dr. J. W. Brown was printed in the *Journal* of September 27 (p. 802).

Dr. William Whitaker writes: As one who knew James W. Brown only for the last ten years, I cannot write of his early life or of the work he did in Grimsby, which brought him international fame, but I would like to present an appreciation of him on behalf of a small group who were privileged to work with him when he was developing the Sheffield regional cardiological unit. James was a rugged individualist, conservative in outlook and naturally shy. Early contact with him was not easy, and this often caused those having only superficial associations with him to consider him a "difficult character." However, once his defence was breached and his confidence established, he was a good companion, a warm friend, and the most loyal of supporters. No man ever tried harder for his juniors, for

in their interests no effort was too great for him to make. Although he never acquired the modern techniques of cardiological investigation, he was early to see their value and enthusiastically accepted them, even though their results sometimes challenged his long-cherished beliefs. As an investigator he remained a morbid anatomist and was delighted to find that there was still an opportunity for morbid anatomical studies in his new department. The work done in Sheffield on the pathology of the pulmonary vascular bed in congenital heart disease gave him great satisfaction. Apart from medicine he will be remembered in Sheffield for his interest in antiques and fly-fishing, and for his powers as a raconteur, which well compensated for any defect there had been in the previous night's catch.

A memorial service for Dr. James Watt will be held at King George V Hospital, Godalming, Surrey, at 11 a.m. on Saturday, November 8.

Medico-Legal

SELLING OF PROPRIETARY MEDICINES

RESTRICTIVE PRACTICES COURT

Last week we reported the hearing of evidence before the Restrictive Practices Court about an agreement between members of the Chemists' Federation ("Journal," October 18, p. 985). The main matter before the Court was a restriction limiting the sale to the public of proprietary medicines made by members of the Federation to retail chemists or pharmacists. Here we record counsels' legal submissions and the Court's decision. Our report is condensed from "The Times" Law Reports.

On October 9, the fourth day of the hearing, Mr. T. G. Roche, Q.C., began his legal submissions on behalf of the Chemists' Federation. He said that the main restriction could be summarized as saying "You will not sell C.F. products to the public other than through chemists, doctors, and hospitals." All the other restrictions were subsidiary to that, in the sense that they were useless save for the main restriction. The Court under section 21 (1) (*a*) of the Restrictive Trade Practices Act, 1956, had to consider whether the circumstances were such that there was a risk of injury to the public and that this was a reasonable way of preventing it. Under paragraph (*b*) the Court had to consider whether the public were getting any benefit from the restrictions and, if so, whether their removal would deny them those advantages. If the restriction was severable, then the Court might declare that part which it thought was of no benefit, and make no order as to the rest, or, if the matter was too complicated to deal with in that manner, then perhaps the Court might intimate in their judgment in what respect the restriction went too far so that application might be made under section 22 when the restriction had been recast.

Mr. Justice Devlin said that the Court would give any helpful guidance which it could, but that they could not pick out medicaments which should not be sold except through chemists.

Federation's Main Argument

Counsel said that the principle on which he relied was that proprietary medicines ought not to be sold otherwise than through a qualified chemist. He also relied upon three supplementary matters: (1) the work of the standards committee; (2) the economic aspect; and (3) storage, for a chemist understood the storage of medicines. Arguing that restrictions were reasonable to prevent injury to health, counsel said that it was no answer to the Federation's case that they would not prevent all injury to health. Under both (*a*) and (*b*) he relied on the same principle, namely, that it was of benefit to the public to get advice and warning on medicines. He submitted that the work of the Federation's standards committee in "vetting" the suitability of the manufacturers for the type of manufacture they were engaged in was clearly beneficial to the public in theory. It had been attacked on the ground that the Federation was anxious to get members and that the inspection was illusory. But there were no grounds for saying that the examination of applications was not properly carried out. No suggestion had been made, he said, resuming his address the next morning (October 10), against the bona fides or credentials of the Federation's council.

Mr. Justice Devlin said that, subject to anything the Registrar's counsel had to say, it could be taken that the Court was satisfied that the examinations were properly conducted.

Counsel then submitted that the benefit to the public arose from the restriction itself. He said that if the restriction went, so would the main scheme. It was expensive in both time and money, and unless there were commercial benefit to both manufacturers and chemists it would not continue, but a commercial motive did not prevent a benefit from being a benefit.

Mr. Justice Devlin.—If manufacturers belonging to the Pharmacists Association of Great Britain are prepared to provide a benefit to the public to the extent that they do without a commercial motive, why should we assume that manufacturer members of the Federation are not so prepared?

Counsel said that the benefit of the scheme was not only in the examination but also that the chemist could safely recommend C.F. products. The truth and reality, from the commercial point of view, was that the P.A.G.B. manufacturers were large manufacturers with millions of capital who spent large sums on advertising and who sold through all channels. The others were smaller men. The scheme, on the commercial side, was a combination of small men against the big manufacturers.

Subsidy to N.H.S.

Counsel then addressed the Court on his second supplementary head of benefit, and said that the resulting wide spread of chemists must be of benefit to the public. The question was, therefore, whether, if the scheme went, that benefit would be abated. If the chemist suffered any weakening of his economic position, a certain number would be driven out of business. The position that he was considering was that in the small country town where there was only one chemist. The chemist was a trader who was a public servant, although there might be others in the same category. No one had criticized the estimate of the chemist's profit as £200.

Mr. Justice Devlin.—But for the loss on National Health Service dispensing, the figure would be larger, about £350. I do not know whether it is a benefit to the public that the restriction subsidizes the National Health Service. If marginal chemists threatened to go out of business it is to be supposed that the Ministry would take steps so that National Health dispensing brought in a profit instead of a loss.

Counsel said that past history did not justify the assumption that the Government would raise the remuneration to prevent loss. When an approach had been made to the Ministry 2½d. a prescription increase had been given, but that was not given until 1956, when expenses had already risen, so that the position was no better than before.

Counsel then said that his third head of supplementary benefit was that a skilled pharmacist provided a better service of storage of medicines than an ordinary trader. As against these benefits, what was there in the debit scale?—the trifling inconvenience of not obtaining C.F. goods at grocers or self-service stores. If this constituted a substantial grievance, members of the public would have sprung forward to give evidence.

Interpretation of the Act

Mr. Cyril Harvey, Q.C., beginning his submissions for the Registrar, said that the Federation's case was based on a fundamental mistake. Mr. Roche had treated section 21 (1) (*b*) as merely a looking-glass reflection of section 21 (1) (*a*). But section 21 (1) (*a*) provided for the justification of a restriction if it were reasonably necessary to protect the public against injury, while section 21 (1) (*b*) provided for its justification if its removal would deny the public other substantial benefits. Mr. Roche had submitted that the restriction was necessary because it tended to make people buy chemical goods only at places where they could obtain good advice, and that because of that factor it came within section 21 (1) (*a*); but that, if the Court did not think chemists' advice was reasonably necessary to protect the public against injury, it could be regarded as a substantial benefit to the public and therefore justified within section 21 (1) (*b*). That submission was fallacious. All that the Registrar had to contend with was the argument that the skilled advice of chemists gave the public protection against injury.

Mr. Justice Devlin.—If it be shown that chemists' advice is not reasonably necessary to protect the public against injury, could not the denial of chemists' advice be a disadvantage to the public?

Counsel said that the section was not dealing with disadvantages but with benefits.

Mr. Justice Devlin.—We do not think that Mr. Roche has made out a prima facie case on fact in relation to his point about advice under either (*a*) or (*b*). We would like to hear you on the benefit said to be conferred by the standards committee; we do not want to hear you on the benefit by the preservation of the small chemist or the benefit in storage. We would also like to hear your argument on the construction of the Act.

Counsel said that the restriction left uncovered a substantial part of the consumer purchases of the relevant products and it was necessary to bear that in mind in asking what "reasonably necessary" in paragraph (*a*) meant. He would submit, on the test proposed by Mr. Justice Boddey in *Stanford* v. *Roberts*, that it meant the restriction that a reasonable man might consider necessary and that it meant more than "desirable" or "required." That was the relevance of the fact that the restriction here did not work, for a reasonable man would not say that such a restriction was necessary for the protection of the public. As to paragraph (*b*) he (counsel) would draw attention to the words "specific and substantial benefits." A classic example of what was not specific was the point made for the Federation, the tendency of an undefined number of persons to resort to chemists' shops, where, if served by the pharmacist himself, they might, or might not, get advice. Even if that was a substantial benefit, it was not specific.

"On the Whole a Good Thing"

Conceding that the C.F. List was on the whole a good thing as regards the standard of products on it—and he was conscious of the justice of the criticism that only two or three items on the List had been attacked as being of dubious quality—there was no evidence to show that abolition of the List would lead to the break-up of the Federation or even that the removal of the main restriction would lead to the cesser of the List. Once the restriction was removed, there could be concentration on one limb of policy—that was the drawing up of one List comprising all products, whether of C.F. manufacturers or not, which were of good quality. But in any event the C.F. List tagged behind the point made about chemists' advice. It depended for its efficacy upon a series of mights—that the customer might be served by a pharmacist and not by an unqualified assistant, that the customer might seek his advice, and that the pharmacist, when his advice was sought, might refer to the C.F. List. Such cases must be very minute indeed.

On October 13, the sixth day of the hearing, Mr. Roche, making his final submissions for the Federation, said that there were two possible constructions of the word "other" in paragraph (*b*) of section 21 (1). Mr. Harvey's construction was that it referred back to and covered benefits which were not within paragraph (*a*) of the subsection. The other construction, which he (counsel) submitted was the right one, was that, as registrable restrictions were deemed to be contrary to the public interest unless the Court was satisfied of certain circumstances, the word "other" was used to distinguish the noxious restrictions and those which were harmless. But, even if the Registrar's construction of the section were right, it did not make any practical difference because his (counsel's) case was a true "and/or." The difference of the C.F. scheme from that of any other body was that it not only exercised the negative control of preventing unworthy advertising but also had the positive advantage of promoting the sale of quality products.

The Court then conferred.

Decision of the Court

Mr. Justice Devlin, giving the decision of the Court, said that the case involved a number of restrictions upon which they would have to pronounce in due course, but underlying them was one fundamental restriction described in the introduction to the *Handbook of the Chemists' Federation* as the principle in which chemists believe "that the correct channel for distribution of medicinal preparations is through premises registered under Section 12 of the Pharmacy and Poisons Act, 1933"—that was, premises under the personal control of a registered pharmacist. The Court, therefore, thought it would be helpful and desirable that they should consider that fundamental restriction first, before they dealt with the terms of the agreements, and they had so considered it. It was sought to justify it on the ground that it was reasonably necessary to protect the public from injury and alternatively that its removal would deny to the public benefits which were specific and substantial.

The Court was not satisfied that it came under either of those grounds, and it followed that they would have to declare it void. As this was the first case and some interesting questions of general importance had been raised they thought it desirable that they should put their reasons into writing. His Lordship then invited counsel to consider the effect of the Court's finding upon the restrictions.

Mr. Roche, dealing with restrictions alleged by the Registrar, but not admitted by the Federation, stemming, *inter alia*, from the Federation's guidance to retailer members that personal recommendation should be given to C.F. products, asked the Court not to deal with these restrictions until after the Federation had had an opportunity of considering whether it desired to go on. As to the agreed restrictions, counsel said that No. 11, not to sell any C.F. product otherwise, in effect, than in the container in which it had been packed by the proprietor, was clearly severable, and so, possibly, was No. 5, that manufacturers should not supply any products eligible for inclusion in the C.F. List without first offering them for inclusion in the List.

Question of an Injunction

After an adjournment to allow counsel to take instructions, Mr. Harvey said the Court could either go on and examine the evidence with regard to discrimination or—and as counsel on both sides would prefer—the matter could wait until after the Court had given their reasons for their decision. In the meantime the Registrar would be able to negotiate with the Federation to see whether or not they would be able and willing to give an undertaking which would have the effect of putting an end to the discrimination to which the Registrar objected. His (counsel's) submissions on restrictions 5 and 11 were that they were merely ancillary to the main restriction and must fall with it. The Registrar also felt that there should not merely be a declaration that the restrictions were void but that there should also be an injunction. As a general principle an injunction ought normally to follow such a declaration.

Mr. Roche agreed that it would be difficult to make further progress until the Federation had had an opportunity of considering the Court's judgment. As to the application for an injunction, his submission was that the Court, as a superior Court of Record, ought not to follow any principles other than those followed by any other Court of Record. There was no evidence that the Federation had the slightest intention to do anything that was illegal, and if it continued to exist there would be no objection to informing the Registrar as to its activities from time to time.

Conclusion

Mr. Justice Devlin said that the order as to the alleged restrictions would be that the issue in relation to them should be stood over with liberty to either party to apply. The Court would hear argument as to restrictions No. 5 and No. 11 in the morning, and also any argument that either side wished to relate upon the proper judgment in relation to any of the agreed restrictions. The Court would deal with the application for an injunction when they gave their reasons for their decision.

The hearing was accordingly adjourned, and the next day (October 14) the Court heard counsels' arguments on restrictions Nos. 5 and 11. After thanking counsel for their assistance, Mr. Justice Devlin said the reasoned judgment of the Court would be given at a later date.

DIMINISHED RESPONSIBILITY REJECTED

[From our Legal Correspondent]

On September 25 the jury at the trial of Donald Ferguson Forbes in Edinburgh on a charge of capital murder rejected his defence of diminished responsibility (*Scotsman*, September 26). Forbes was charged with assaulting Allan Fisher, a night watchman, by beating him with an iron bolt, with robbing him of a cigarette case, a lighter, and £11 10s., and with his murder.

Psychiatric Evidence

Sir David Henderson, formerly professor of psychiatry at Edinburgh University, who had examined Forbes as to his mental condition in Saughton Prison on September 17, gave evidence for the defence. He said that Forbes was in one of those difficult conditions when one almost hesitates to differentiate between what one calls sanity and what one calls a certain state of mental instability which from time to time can be exaggerated by the circumstances in which the person is placed. His was the nearest approach to what is called a "psychopathic constitution," where reason and intelligence are unimpaired but where a person for the time being is dominated by an episodic burst of conduct apt to come about in strained circumstances. He was not suffering from any form of mental unsoundness which would justify certification and admission to a mental hospital, but showed an amount of emotional instability which brought him within the category of diminished responsibility. He corresponded to the psychopathic type of person who is essentially a law unto himself, and that, in the witness's view, was a sign that he suffered from some form of mental disease, so that he came within the definition of diminished responsibility.

For the prosecution Dr. William Boyd, who had first examined Forbes in prison on June 10, said that in his opinion Forbes did not border on or approach to insanity, nor suffer from any form of mental disease or great aberration or peculiarity of mind. Although he had had three years' psychiatric treatment and supervision he was not suffering from substantial impairment of responsibility. Dr. Macrae, who examined Forbes on June 11, said that he found no evidence of diminished responsibility, mental disease, partial insanity, or peculiarity of mind.

Lord Wheatley in summing up told the jury that on diminished responsibility the onus of proof was on the defence to prove their case on the balance of probabilities. Forbes had had unfortunate experiences as a child, and whether the maladjustment from which he suffered as a child had subsided or proceeded into his present state and whether that condition, alone or in combination with other factors, had produced a defect of mind sufficient to justify invocation of the doctrine of diminished responsibility, had to be resolved by the jury. They were not entitled to hold diminished responsibility proved because they thought there were mitigating circumstances in Forbes's life, unless these circumstances constituted a condition of mind which in itself would justify the invocation of the doctrine.

The jury returned a majority verdict after an absence of an hour and a half, and sentence of death was passed. It was subsequently commuted to life imprisonment by the Secretary of State for Scotland.

Vital Statistics

Diphtheria

The 25 cases of diphtheria notified in England and Wales in the week ending October 11 were the largest total for nearly three years. Seven of them were in Essex, Barking M.B. (where one child has died), and 15 in London—Finsbury 10, Holborn 4, and Islington 1.

The outbreak at Barking is caused by the *gravis* strain. Two further cases were notified in the week ending October 18, and numbers of notifications exclude 14 carriers found by swabbing. The outbreak began in a single class of about 35 children in an infants' school. It has not so far spread beyond the children of that class and their home contacts. The child first to be detected with the disease has died, and two others have carditis. The other cases are mild.

The outbreak in London is caused by a virulent *mitis* strain. The cases are mild, and the majority of those notified were carriers detected by swabbing. The two initial cases were not clear-cut, and several cases are apparently primarily of tonsillitis but also carry the diphtheria organism.

Week Ending October 11

The largest rises in the number of notifications of infectious diseases in England and Wales during the week ending October 11 were 790 for measles, from 1,988 to 2,778, 70 for dysentery, from 442 to 512, 44 for acute poliomyelitis, from 69 to 113, and 20 for diphtheria, from 5 to 25; the largest falls were 87 for food-poisoning, from 316 to 229, and 51 for whooping-cough, from 551 to 500.

The number of notifications of acute poliomyelitis, 113, was the largest reported this year and is an exceptionally late peak incidence. These cases were 30 more for paralytic and 14 more for non-paralytic cases than in the preceding week. The largest returns were Lancashire 27 (Manchester C.B. 12, Blackpool C.B. 3, Padiham U.D. 3, Burnley C.B. 2); Yorkshire West Riding 16 (Leeds C.B. 5); Bedfordshire 8 (Bedford M.B. 8); Cheshire 8 (Stockport C.B. 2, Bebington M.B. 2); Durham 7 (Brandon and Byshottles U.D. 3); Middlesex 6 (Heston and Isleworth M.B. 3).

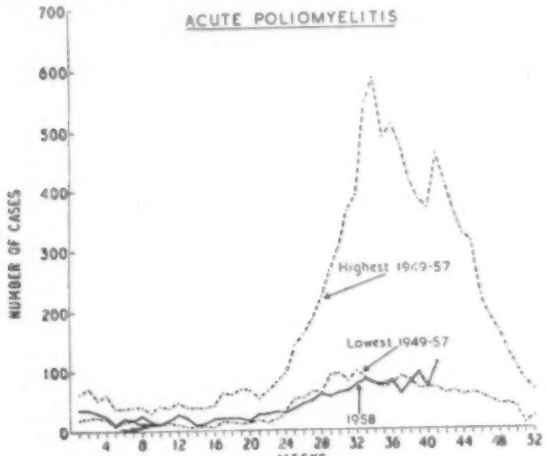
The number of notifications of diphtheria were the largest for almost three years, and are the subject of a separate report. The largest increases in the incidence of measles were 106 in Yorkshire West Riding, from 200 to 306 (Keighley M.B. 59, Royston U.D. 45); 94 in Cheshire, from 82 to 176 (Congleton M.B. 53); 87 in Devonshire, from 53 to 140 (Axminster R.D. 49); 58 in Lincolnshire, from 47 to 105. The largest fluctuations in the trends of scarlet fever were a rise of 22 in Lancashire, from 83 to 105, and a fall of 22 in Staffordshire, from 56 to 34. The total notifications of scarlet fever, 648, were 9 fewer than in the preceding week. No large variations in trend were reported in the local returns of whooping-cough.

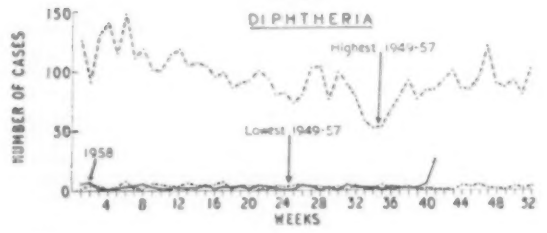
For the fifth consecutive week the number of notifications of dysentery have increased. The chief centres of infection during the week were Yorkshire West Riding 98 (Leeds C.B. 22, Dearne U.D. 22, Ripon and Patley Bridge R.D. 14), London 69 (Islington 13, Hammersmith 11), Lancashire 44

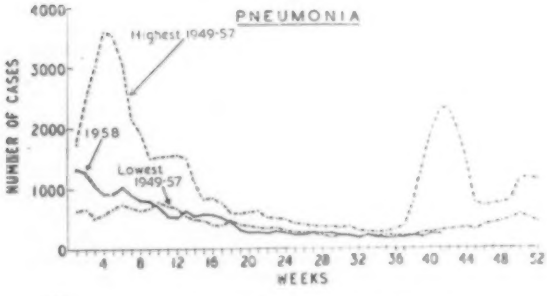
(Liverpool C.B. 15), Warwickshire 41 (Coventry C.B. 24, Birmingham C.B. 10), Hampshire 31 (Southampton C.B. 25), Glamorganshire 29 (Cardiff C.B. 9, Penarth U.D. 9), and Essex 28 (West Ham C.B. 17).

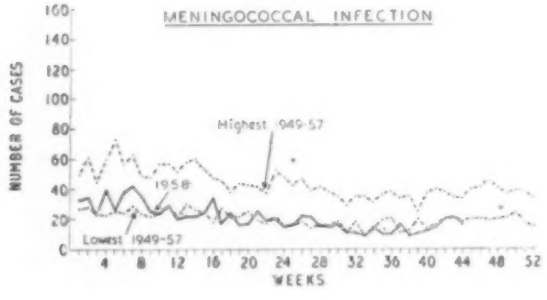
Graphs of Infectious Diseases

The graphs below show the uncorrected numbers of cases of certain diseases notified weekly in England and Wales. Highest and lowest figures reported in each week during the years 1949–57 are shown thus - - - - - -, the figures for 1958 thus ————. Except for the curves showing notifications in 1958, the graphs were prepared at the Department of Medical Statistics and Epidemiology, London School of Hygiene and Tropical Medicine.









INFECTIOUS DISEASES AND VITAL STATISTICS

Summary for British Isles for week ending **October 4** (No. 40) and corresponding week 1957.

Figures of *cases* are for the countries shown and London administrative county. Figures of *deaths* and *births* are for the whole of England and Wales (London included), London administrative county, the 17 principal towns in Scotland, the 10 principal towns in Northern Ireland, and the 14 principal towns in Eire.

A blank space denotes disease not notifiable or no return available.

The table is based on information supplied by the Registrars-General of England and Wales, Scotland, N. Ireland, and Eire, the Ministry of Health and Local Government of N. Ireland, and the Department of Health of Eire.

CASES	1958 Eng. & Wales	1958 Lond.	1958 Scot.	1958 N. Ire.	1958 Eire	1957 Eng. & Wales	1957 Lond.	1957 Scot.	1957 N. Ire.	1957 Eire
Diphtheria ..	5	4	0	0	2	3	0	7	1	4
Dysentery	442	51	222	17	1	262	22	93	4	
Encephalitis, acute	3	1		0		3	0		0	
Enteric fever:										
Typhoid ..	1	0	0	0		6	0	0	0	
Paratyphoid ..	5	0	11(B)	0	6(B)	4	0	0	0	
Food-poisoning ..	316	42	19	1		115	16	2	1	
Infective enteritis or diarrhoea under 2 years				19	41				10	35
Measles*	1,988	122	19	17	115	1,328	23	26	20	25
Meningococcal infection	12	0	9	0		14	3	10	0	
Ophthalmia neonatorum	25	3	5	0		34	5	8	0	
Pneumonia† ..	211	19	121	9		1,880	85	872	17	2
Poliomyelitis, acute:										
Paralytic ..	53	2	21	3	7	87	5	2	12	2
Non-paralytic ..	16	2				29	2			
Puerperal fever§ ..	207	19	12	0		271	35	4	3	
Scarlet fever ..	657	49	74	13	30	305	28	54	17	20
Tuberculosis:										
Respiratory ..	494	45	91	17		439	51	122	14	
Non-respiratory	74	6	15	2		57	4	11	3	
Whooping-cough ..	551	20	63	46	26	383	29	31	2	19

DEATHS	1958 Eng. & Wales	1958 Lond.	1958 Scot.	1958 N. Ire.	1958 Eire	1957 Eng. & Wales	1957 Lond.	1957 Scot.	1957 N. Ire.	1957 Eire
Diphtheria ..	0	0	0	0	0	No comparable figures available.	0	0	0	0
Dysentery	0	0		0			0		0	
Encephalitis, acute		0			0		0			0
Enteric fever	0	0	0	0			0	0	0	
Infective enteritis or diarrhoea under 2 years	3	0	0	1	0		6	0	1	1
Influenza	9	0	0	0	0		24	75	5	1
Measles		0	0	0	0		0	0	0	1
Meningococcal infection		0	0				1	0	0	
Pneumonia ..	322	26	21	9	3		39	71	16	8
Poliomyelitis, acute	5	0		0	0		1		0	0
Scarlet fever ..		0	0	0	0		0	0	0	0
Tuberculosis:										
Respiratory ..	86	5	8	1	4		0	9	3	3
Non-respiratory		1	1	0	1		1	1	0	0
Whooping-cough ..	1	0	0	0	0		0	0	0	0
Deaths 0–1 year ..	302	30	34	4	10		31	24	8	20
Deaths (excluding stillbirths) ..	8,506	678	554	110	134		785	812	119	145
LIVE BIRTHS ..	14,239	1161	1041	226	319		1181	1038	249	434
STILLBIRTHS ..	341	25	29				22	9		

* Measles not notifiable in Scotland, whence returns are approximate.
† Includes primary and influenzal pneumonia.
§ Includes puerperal pyrexia.

Medical News

On Call to a Nation.—The B.B.C. marked the tenth anniversary year of the National Health Service with a documentary film of it at work. Shown at a peak viewing hour on the evening of October 22, the film, "On Call to a Nation," lasted 75 minutes and was the longest documentary programme the B.B.C. television service had done. There were no professional actors: the audience saw genuine doctors, dentists, and other medical workers, together with patients, in the natural setting of their relationship. The programme, however, was not intended as a study of the Health Service itself. It mainly pictured the daily life of doctors and how the Health Service affected them. Twenty-five of the 57 doctors appearing had something to say about it. Rural G.P.s, urban G.P.s, big-list men, and small-list men, and men in organized group practices, gave their views, such as time would allow, on general practice. At one extreme was a big-list town G.P. who entirely approved of the Service, and at the other was a semi-rural practitioner who entirely disapproved. In between were seven others who had reservations of varying degree and kind. Some of the criticisms were of other branches of the Service, and the critics were not confined to G.P.s. The audience saw a consultant dictating letters at the end of an out-patient session, and heard his comments on cases and on doctors' letters. The cost of the Service and the public's responsibility for financing it was plainly put by another consultant. The cost of drugs was emphasized in scenes in which a pricing bureau was shown dealing with millions of prescription forms, and the need for capital expenditure on hospitals was highlighted by several shots of antiquated buildings and makeshift premises whose span of service had long exceeded the few years originally intended for them. The programme's anchor was a family doctor's waiting-room. One at a time the doctor dealt with eight patients, and their cases served to move the programme from one aspect of the Health Service to another. Mr. Richard Cawston wrote and produced the film and Colin Wills spoke the commentary. Professional bodies were consulted in the first place, it was stated, but they had no part in planning the actual programme. The speakers' opinions, too, were their own and not those of any organization.

Wellcome Research Grants.—The Wellcome Trustees announce that among the grants sanctioned by them during the half-year ended August 31 were the following: (1) *Postgraduate Medical School of London.*—Up to £60,000 for the cost of including a Wellcome research library in the proposed new buildings. (2) *Institute of Psychiatry, Maudsley Hospital.*—Up to £37,000 to provide laboratories in which integrated research by the departments of neuro-endocrinology and neuropathology may be carried out. (3) *Department of Anatomy, Birmingham University.*—Up to £36,500 to extend the research laboratories and animal accommodation. (4) *Department of Zoology, Edinburgh University.*—Up to £25,000 to provide additional research accommodation. (5) *University of Western Australia.*—£50,000 to endow a Wellcome research department of pharmacology. (6) *Institute of Medical Research, North Shore Hospital of Sydney.*—Up to £17,000 to build and equip laboratories for experimental medicine and surgery. In addition, three electron microscopes are being purchased at a cost of approximately £34,000, for indefinite loan to the M.R.C. Biophysics Research Unit at King's College, London, the Sir William Dunn School of Pathology, Oxford, and the London School of Hygiene and Tropical Medicine.

Anglo-French Exchange Bursaries.—Applications are now invited for the bursaries which will be awarded in 1959 to young British doctors under the exchange scheme arranged by the French Embassy in London between the Institut National d'Hygiène in Paris and the Ciba Foundation in London. The value of the French grants is 60,000 francs a month, tax free. Bursaries will be awarded for periods of two to four months to medical men who wish to obtain clinical experience or carry out research in France. Application forms and further details may be obtained from Dr. G. E. W. Wolstenholme, Ciba Foundation, 41, Portland Place, London, W.1. The closing date is January 31.

P.R.C.P.I.—Dr. P. T. J. O'Farrell, a past-president of the British Medical Association, has been elected President of the Royal College of Physicians of Ireland.

First Manson Oration.—On October 16 Sir Philip Manson-Bahr delivered the first Manson Oration before the Royal Society of Tropical Medicine and Hygiene. He gave an autobiographical review entitled "The March of Medicine During the Last Fifty Years." The oration was at the Society's house in London.

"Clinical Science."—Professor G. M. Bull is to succeed Professor W. Melville Arnott as editor of *Clinical Science* on January 1. Professor Bull is professor of medicine at Queen's University, Belfast.

"Nursing Times."—The layout of the *Nursing Times*, the journal of the Royal College of Nursing, has been attractively restyled as a result of a questionary to its readers. "Many of you besought us to *look* lighter and more readable," states the journal. Certainly the October 10 issue, the first to appear in the new uniform, looks thoroughly attractive.

W.H.O.—Dr. W. A. Timmerman, assistant director-general of W.H.O. in charge of Central Technical Services, is retiring under the age limit. His successor has not yet been appointed. Dr. Timmerman, who joined W.H.O. in 1950, was previously director of the National Institute for Public Health in the Netherlands.

Chair of Paediatrics, Makerere College.—Dr. D. B. Jelliffe, visiting professor of tropical medicine at Tulane University, New Orleans, has been appointed to the Unicef chair of paediatrics at Makerere College, University College of East Africa. Dr. Jelliffe graduated in medicine from the Middlesex Hospital in 1943.

General Board of Control.—The Secretary of State for Scotland has appointed Dr. Anne N. M. Brittain a deputy medical commissioner of the General Board of Control for Scotland.

COMING EVENTS

Association of Industrial Medical Officers.—Meeting in London, October 30 (jointly with the Empire Rheumatism Council) and November 1. Details from the hon. secretary, 47, Lincoln's Inn Fields, London, W.C.2.

Mitchell Banks Memorial Lecture.—Sir Gordon Gordon-Taylor will lecture on "The Incomputable Factor in Cancer Prognosis" at 4.45 p.m. on October 29 at the New Medical School, Liverpool University.

Uses of Plastics in Medicine.—Six lectures on Wednesdays, 6.30–8.30 p.m., starting on October 29, at the National College of Rubber Technology, Holloway Road, London, N.7. Details from the head of the College.

Heath Clark Lectures.—Dr. Karl Evang, of Norway, will give five lectures on "Health Service, Society, and Medicine" at 5.30 p.m. daily, from November 3 to 7, at the London School of Hygiene and Tropical Medicine.

Bradshaw Lecture.—Professor K. W. Donald, D.S.C., will lecture on "Heart Disease and Exercise" at 5 p.m. on November 6 at the Royal College of Physicians, Pall Mall East.

McMurray Lecture in Orthopaedic Surgery.—Professor W. P. Blount, of Marquette University, Wisconsin, will lecture on "Fractures in Children" at 5.15 p.m. on November 7 at the New Medical School, Liverpool University.

Stephen Paget Memorial Lecture.—Mr. RICHARD FORT, M.P., will lecture at 5.30 p.m. on November 18 in the lecture theatre, Zoological Society of London, Regent's Park, on "The Irrational in Public Life." The annual meeting of the Research Defence Society will follow the lecture.

Faculty of Radiologists.—Postgraduate course in radiology, November 22 and 23 at the Royal College of Surgeons. Further details from the Faculty, 47, Lincoln's Inn Fields, London, W.C.2.

Bethlem Royal and Maudsley Hospitals.—Medical staff ball, November 28, at the Kensington Palace Hotel. Tickets from Dr. BRIAN ACKNER at the Maudsley Hospital, Denmark Hill, London, S.E.5.

London School of Hygiene and Tropical Medicine Association.—Annual dinner at the Waldorf Hotel, Aldwych, London, W.C.2, on Thursday, November 27, at 7 for 7.30 p.m. (dinner jackets). Tickets, 30s. each (exclusive of drinks but including light refreshments at 10.30 p.m. and dancing until midnight), from Miss K. M. SHAW at the School. Guests may be invited.

Sixth International Conference in Planned Parenthood.—New Delhi, February 14 to 21, 1959. Further details from the conference secretary, 1, Metropolitan House, Dadabhai Naoroji Road, Bombay, 1.

NEW ISSUES

SPECIALIST JOURNALS AND ABSTRACTS

The journals listed below are obtainable from the Publishing Manager, B.M.A. House, Tavistock Square, London, W.C.1.

British Journal of Ophthalmology.—Issued monthly (£6 annually). The new issue, Vol. 42, No. 10, includes:

SPECIFICITY AND COMPARATIVE ACTIVITY OF THE CARBONIC ANHYDRASE INHIBITORS NEPTAZANE AND DIAMOX ON ANIMAL AND HUMAN EYES. M. E. Langham.
BENZOCAINE URETHANE SOLUTION IN OPHTHALMOLOGY. P. A. Graham.
CYBERNETICS OF OCULAR MOVEMENT. D. Stanley-Jones.
HISTOLOGICAL SIGNIFICANCE OF HEMISPHERICAL BODIES IN THE EYE. N. Ashton and A. F. M. Mohamed.
INTRA-OCULAR FOREIGN BODY. W. J. Levy.
FAMILIAL MACULAR DEFECTS. I. D. R. Gregory.
PENETRATION OF SODIUM AND THIOCYANATE INTO THE POSTERIOR AND ANTERIOR CHAMBERS. V. E Kinsey and E. Palm.
ALTERNATIVE TO THE 3-SNIP OPERATION FOR LACRIMAL DRAINAGE INSUFFICIENCY. C. Montague Ruben.
AMBLYOPIA DUE TO ETHYL ALCOHOL. M. Quatermass.
COMPLETE OPHTHALMOPLEGIA IN A CASE OF ACUTE TOXIC POLYNEURITIS. F. R. Neubert.
UNUSUAL TRAUMATIC DEFORMITY OF THE LENS. P. Sivasubramaniam.
GLAUCOMA FOLLOWING RADIOTHERAPY. R. F. Jones.

Abstracts of World Medicine.—Issued in the first week of each month, this journal contains abstracts of important papers selected from the current medical literature of the world. Annual subscription £4 4s.

SOCIETIES AND LECTURES

A fee is charged or a ticket is required for attending lectures marked ●. Application should be made first to the institution concerned.

Monday, October 27

GUY'S HOSPITAL.—At Anatomy Lecture Theatre, 5.15 p.m., lecture-demonstration in endocrinology by Dr. P. M. F. Bishop: Exophthalmos.
INSTITUTE OF CHILD HEALTH.—5 p.m., Guest lecture by Professor I. Doeramaci (Turkey): Malnutrition in Infancy and its Management.
MANCHESTER MEDICAL SOCIETY. (1) SECTION OF ODONTOLOGY.—At Lecture Room, Dental Hospital, 4.30 for 5 p.m., Presidential Address by Mr. D. H. Cartledge: Our Dental Heritage. (2) SECTION OF GENERAL PRACTICE.—At Large Anatomy Theatre, Medical School, Manchester University, 8.30 for 9 p.m., Professor S. Alstead: Medical Truants.
POSTGRADUATE MEDICAL SCHOOL OF LONDON.—4 p.m., Guest lecture by Dr. B. Ackner: Psychiatric Aspects of Termination of Pregnancy.

Tuesday, October 28

BRISTOL UNIVERSITY.—At Large Lecture Theatre, H. H. Wills Physics Laboratory (Royal Fort), 8.15 p.m., 47th Long Fox Memorial Lecture by Professor A. I. Darling: Decay of the Teeth (Dental Caries).
BRITISH POSTGRADUATE MEDICAL FEDERATION.—At London School of Hygiene and Tropical Medicine, 5.30 p.m., Dr. G. S. Wilson: Infectious Enteritis.
INSTITUTE OF DERMATOLOGY.—5.30 p.m., Dr. G. C. Wells: Dermal Connective Tissue.
ROYAL STATISTICAL SOCIETY.—At New Small Lecture Theatre, London School of Hygiene and Tropical Medicine, 5.30 p.m., Dr. O. M. Lidwell and Dr. R. E. O. Williams: Effect of Various Factors on the Incidence of the Common Cold.
ST. MARY'S HOSPITAL MEDICAL SCHOOL.—At Wright-Fleming Institute Theatre, 5 p.m., Mr. David Currie: Miracle of Childbirth.
WEST END HOSPITAL FOR NEUROLOGY AND NEUROSURGERY.—5.30 p.m., Dr. G. Parsons-Smith: neurological demonstration.

Wednesday, October 29

INSTITUTE OF DERMATOLOGY.—5.30 p.m., Dr. R. W. Riddell: Ringworm Infections.
INSTITUTE OF DISEASES OF THE CHEST.—5 p.m., Dr. F. H. Scadding: Open lecture on the mode of presentation of carcinoma of the bronchus.
INSTITUTE OF UROLOGY.—4.30 for 5 p.m., Mr. D. M. Wallace: Vesical Neoplasms.
LIVERPOOL UNIVERSITY: FACULTY OF MEDICINE.—At Large Lecture Theatre, New Medical School, Ashton Street, 4.45 p.m., William Mitchell Banks Memorial Lecture by Sir Gordon Gordon-Taylor, K.B.E.: Incomputable Factor in Cancer Prognosis.
●NATIONAL COLLEGE OF RUBBER TECHNOLOGY, Northern Polytechnic, Holloway Road, London, N.—6.30 p.m., Dr. S. A. Leader: Application of Plastics to Medicine and Surgery. (The first in a course of six lectures.)
OXFORD UNIVERSITY.—At Radcliffe Infirmary, 5 p.m., Litchfield Lecture by Dr. W. G. Spector: The Role of Endogenous Mechanisms in Acute Inflammation.
POSTGRADUATE MEDICAL SCHOOL OF LONDON.—2 p.m., Guest lecture by Dr. P. Fourman: Magnesium Metabolism.
ROYAL INSTITUTE OF PUBLIC HEALTH AND HYGIENE.—3.30 p.m., Dr. Annie Sydenham: Maternity and Child Welfare Work in a Hong Kong Mission Hospital (illustrated).

Thursday, October 30

BRITISH POSTGRADUATE MEDICAL FEDERATION.—At London School of Hygiene and Tropical Medicine, 5.30 p.m., Dr. R. E. O. Williams: Epidemic Staphylococcal Infection in Hospitals.
HONYMAN GILLESPIE LECTURES.—At Anatomy Theatre, University New Buildings, Teviot Place, Edinburgh, 5 p.m., Professor A. G. R. Lowden: Emergency Re-operations in Abdominal Surgery.
INSTITUTE OF DERMATOLOGY.—At London School of Hygiene and Tropical Medicine, 5.30 p.m., Dr. R. E. O. Williams: Epidemic Staphylococcal Infections in Hospitals.
INSTITUTE OF PSYCHIATRY.—At Maudsley Hospital, 5 p.m., Inaugural Lecture by Professor P. M. Daniel: Some Experimental Approaches to Neuropathology.
ROYAL COLLEGE OF SURGEONS OF ENGLAND.—5 p.m., Thomas Vicary Lecture by Sir John McNee: Barber-Surgeons in Great Britain and Ireland.
ROYAL NORTHERN HOSPITAL.—2.45 p.m., Mr. R. J. McNeill Love: Abdominal Pain (cases and discussion).
ST. ANDREWS UNIVERSITY.—At Physiology Department Lecture Theatre, 5 p.m., Mr. Hedley Atkins: Three Pillars of Clinical Research.

Friday, October 31

COLLEGE OF GENERAL PRACTITIONERS: SOUTH LONDON FACULTY.—At King's College Hospital Medical School, 8.45 p.m., Professor J. S. Mitchell: Nuclear Fission in Relation to Medicine.
●INSTITUTE OF DERMATOLOGY.—5.30 p.m., Dr. I. Muende: clinical demonstration.
INSTITUTE OF DISEASES OF THE CHEST.—5 p.m., Dr. K. F. W. Hinson: clinical demonstration.
INSTITUTE OF LARYNGOLOGY AND OTOLOGY.—(1) 3.30 p.m., clinical discussion for general practitioners by Miss Edith Whetnall: Advances in the Use of Hearing-aids. (2) 5.30 p.m., clinical lecture by Dr. T. V. L. Crichlow: Some Oesophageal Problems.
KEIGHLEY AND DISTRICT MEDICAL SOCIETY.—At Victoria Hospital, Keighley, 8.30 p.m., Mr. A. B. Pain: Pain in the Arm.
MEDICAL SOCIETY FOR THE STUDY OF VENEREAL DISEASES.—At 11, Chandos Street, W., (1) 7 p.m., 37th annual general meeting; (2) 8.15 p.m., Dr. B. F. Reeves: Variations in the Leucocyte Content of the Cervical Secretions; Dr. J. H. Eckersley and Dr. J. Barrow: Locan Pessaries in the Treatment of Trichomonas Vaginitis.
PLYMOUTH MEDICAL SOCIETY.—At Freedom Fields, 8.30 p.m., Dr. A. E. Clark-Kennedy: The Right to Die.
POSTGRADUATE MEDICAL SCHOOL OF LONDON.—(1) 10 a.m., Guest lecture by Professor P. A. Fitzgerald: Adrenal Surgery. (2) 4 p.m., Guest lecture by Dr. E. N. Chamberlain: Rheumatic Carditis.
●ST. MARY'S HOSPITALS, MANCHESTER.—At Large Lecture Theatre, Clinical Sciences Building, York Place, Manchester, 4.30 p.m., Lloyd Roberts Lecture by Professor A. M. Claye: Teaching of Obstetrics—New Edition.

Sunday, November 2

COLLEGE OF GENERAL PRACTITIONERS: WELSH FACULTY.—At Maternity Hospital, Cardiff Royal Infirmary, 10.45 a.m. The Pathology Department and the General Practitioner. Speakers: Professor J. Gough, Dr. J. L. Withey, and Dr. R. A. Holman.
MANCHESTER UNIVERSITY: FACULTY OF MEDICINE AND NORTH-WEST ENGLAND FACULTY, COLLEGE OF GENERAL PRACTITIONERS.—At Theatre 1, Clinical Sciences Building, York Place, 11 a.m., Dr. F. R. Ferguson: Headache.
UNIVERSITY COLLEGE HOSPITAL.—10.15 a.m., meet in Front Hall of main hospital. Lecture-demonstration for general practitioners. Clinical demonstration by Dr. K. E. Harris: Cardiac Irregularities, Their Significance and Treatment.

BIRTHS, MARRIAGES, AND DEATHS

BIRTHS

Edwards.—On October 11, 1958, at Liverpool Maternity Hospital, to Phyllis (formerly Pinchin), wife of Dr. David G. Edwards, of 12, Childwall Park Avenue, Liverpool, a brother for Jacqueline—Robert David.
Oakenfull.—On October 7, 1958, at the Maternity Home, Scunthorpe, Lincs, to Isabel (formerly Heath), M.B., Ch.B., wife of Basil G. P. Oakenfull, F.F.A. R.C.S., a son (Andrew)—a brother for Michael.
Smith.—On October 9, 1958, to Loretta, wife of Colin McPherson Smith, M.B., F.R.C.P.(C)., D.P.M., a brother for Joy and Colin—John Graham.

DEATHS

Barker.—On September 29, 1958, Robert Sidney Barker, M.B., B.S., of 13, Byway Road, Leicester, aged 75.
Beddows.—On October 3, 1958, at Ingleton, Gullane, East Lothian, Edward Charles Beddows, O.B.E., *M.C.*, M.R.C.S., L.R.C.P., Brigadier, late R.A.M.C., retired, aged 72.
Cohen.—On September 30, 1958, at Park Hospital, Davyhulme, Manchester, Percy Cohen, M.R.C.S., L.R.C.P., of Manchester Road, Bolton, Lancs, aged 44.
Collard.—On October 5, 1958, Bevil Molesworth Collard, M.R.C.S., L.R.C.P., of 37, Elms Road, Leicester.

Any Questions ?

We publish below a selection of those questions and answers which seem of general interest. It is regretted that it is not possible to supply answers to all questions submitted.

Anaesthesia for Forceps Delivery

Q.—*What is your opinion of an anaesthetic for domiciliary forceps delivery consisting of 0.5 g. thiopentone sodium, continuing with N_2O and air (midwife's apparatus), and 50 mg. intravenous pethidine later if necessary?*

A.—The suitability of a particular anaesthetic technique for domiciliary obstetric surgery must be judged against a background of many factors, not the least of which is the skill and experience of the administrator. The safe use of a combination of drugs such as this obviously requires familiarity with their clinical effects. In addition it requires a good knowledge of the hazards of general and intravenous anaesthesia in obstetrics, and of the special risks of this combination of drugs, such as extravenous and intra-arterial injection and respiratory depression of mother and child. Certainly the administrator should possess the skill and equipment for maintaining oxygenation during any period of respiratory insufficiency. Whether all these desirable conditions are likely to be found in the circumstances of domiciliary obstetrics is another matter.

Penicillin Sensitivity

Q.—*Can penicillin lozenges (1,000 units) cause penicillin sensitivity when taken for a few days only?*

A.—It is well known that penicillin is a potent sensitizing agent, particularly for the epidermis, and that the indiscriminate use of penicillin on the skin or by ingestion is discouraged. Allergic reactions have occurred after the oral use of penicillin, and, although it is unlikely, there is no reason to believe that oral penicillin could not cause sensitivity.

Dietary Treatment for Pseudo-hypertrophic Muscular Dystrophy

Q.—*What is the rationale of a dietary treatment for pseudo-hypertrophic muscular dystrophy, and have any controlled studies shown its value in this disease?*

A.—Evers[1] has advocated a dietary treatment of "progressive muscular dystrophy (Erb)." He quotes two patients whom he believes to have benefited from this form of therapy. A note at the end of the paper indicates that the diagnosis in one case may have been polyneuritis. Details of the diet are not given but may be obtained from Dr. Evers; the rationale of the treatment is not discussed. There is no evidence that dietary treatment is of value in muscular dystrophy. Assessment of the efficacy of treatment in these patients may be difficult, as long periods of arrest are a characteristic feature of some forms of the disease.

REFERENCE

[1] Evers, J., *Münch. med. Wschr.*, 1954, 2, 41.

Hiatus Hernia

Q.—*What are the indications and contraindications for operation for hiatus hernia?*

A.—About 85% of patients with hiatus hernia can be controlled moderately well on a medical regime with emphasis on weight reduction, sleeping with the shoulders raised above the level of the abdomen, avoiding stooping and bending, and the use of antacids. However, there is a small proportion for whom life remains a misery, and these are the patients to select for surgery. Some will have severe symptoms from peptic oesophagitis with much heartburn, and sometimes dysphagia from stricture formation. Others may have acute discomfort with a feeling of a heavy lump after eating. The presence of an associated gastric or duodenal ulcer accentuates the indication for operation. A gastric ulcer at the level of constriction at the diaphragm is a common site. Recurrent haematemesis and recurrent aspiration pneumonia are further indications. The operation is well tolerated and patients convalesce quickly. The contraindications are those for any abdominal operation: obesity particularly should deter a surgical programme. On no account should a patient without relevant symptoms ever be considered for surgery just because the diagnosis has been made radiologically.

Speaker's Fright

Q.—*What advice and treatment would you suggest for those who are afflicted with nervousness and excessive salivation when faced with having to give a talk or make an after-dinner speech?*

A.—The symptoms described are those of a mild anxiety-tension state which is quite normal and usual in the circumstances. The tendency to salivation is unusual, drying of the mouth being more common, and if there is enough of it to be an embarrassment it might perhaps be countered by a small dose of atropine. The anxiety and nervousness could also be relieved to some degree by a tranquillizer such as meprobamate, or if necessary by a small dose of a quickly acting barbiturate. Caution should be exercised in the latter event if alcohol is taken too.

The best long-term treatment for this syndrome is the gaining of greater experience. With a little practice, short speeches on social occasions soon become no trouble, even to those liable to anxiety. Having something one actually wants to say is a great help; if there is sincerity in what is said audiences are very tolerant indeed of anxiety or faults in presentation. The tyro after-dinner speaker is strongly recommended to put his speech entirely out of his mind during the dinner, and to concentrate on the conversation of his neighbours and the other pleasures of the occasion. If he has a few notes in his pocket, he can safely rely on them when the moment comes.

Keeping Toddlers in Cots

Q.—*What is the best way to prevent toddlers falling out of standard hospital cots?*

A.—Any form of restraint is certainly psychologically objectionable for toddlers, but unfortunately some form of restraint is necessary in hospital, and often at home, if the child is left alone in its cot to any extent. The string net covering the top of the cot and tying at the sides allows the most freedom and is probably the pleasantest. It allows a child to crawl about inside the cot, although the bigger toddler cannot stand upright. There is the risk that a child of 18 months and upwards will learn to untie the net and even to get its head between the net and the side of the cot, but for all that it is probably the best form of restraint for the small child. The alternative is the restrainer shaped like a waistcoat and tying at the back with straps sewn on at the sides just above the hips and tied to the horizontal sides of the cot. These are perfectly safe and do not involve risk of strangulation, but do not allow movement on the part of the child.

Fat at 15

Q.—*An otherwise healthy girl of 15 has become rather rapidly overweight. The diet is already reduced to a minimum. Can any drug or hormone therapy be advised?*

A.—Even though a "fat spurt" takes place at puberty, there can be little doubt that, whatever the ultimate cause may be, the mediating factor in this developing obesity is excessive calorie intake. If weight gain is continuing then the diet, far from having been reduced to a minimum, is still in excess of the actual physiological requirements; to bring about weight loss the diet must obviously be less than the physiological requirements, so far as total energy

content is concerned. The only drug therapy likely to be of value is some form of amphetamine such as dextro-amphetamine sulphate or methylamphetamine hydrochloride, which helps to control excessive appetite. No hormone therapy can possibly be of value, and in particular it may be mentioned that thyroid therapy is quite useless. Only by producing a state of thyrotoxicosis can it lead to weight loss, and if given in doses too small to do this it either has no effect or increases the appetite.

Treating Tapeworms at Home

Q.—*Is there any treatment, short of hospitalization, for tapeworm infestation in a child of 3 to 5 years who has already been antagonized to any medicine by treatment with Filix mas?*

A.—Domiciliary treatment for tapeworms is not advisable, for toxic effects not easily managed at home—for example, collapse—may occasionally occur. Moreover, the relapse rate at home is high because it is difficult to ensure complete starvation and proper administration of drugs. In the case in question treatment with dichlorophen could be tried, but experience shows that the relapse rate following such treatment is high. The usual treatment with dichlorophen consists of a single dose of 0.5 g. per 16 lb. (7.2 kg.) of the patient's body weight.

NOTES AND COMMENTS

Treatment of Schistosomiasis.—Dr. H. A. K. Rowland (Ibadan, Nigeria) writes: In "Any Questions?" (August 2, p. 339) the relative advantages and disadvantages of the available drugs for the treatment of schistosomiasis were briefly discussed. It was stated that sodium antimony gluconate gave rise to few side-effects but that after treatment twice as many patients continued to have symptoms as after sodium antimony tartrate. During 1954–5, a clinical trial of sodium antimony gluconate was carried out.[1] 148 patients suffering from urinary schistosomiasis being treated with total dosages of (1) 18–31.3 mg./kg. administered over periods ranging from 24 to 120 hours, and (2) 12.5–17.1 mg./kg. in 8 hours. The test of cure consisted of urine examinations by microscopy and hatching tests on the centrifuged deposit at monthly intervals for six months, the last examination being on three consecutive daily specimens. In addition a rectal biopsy was carried out at six months.[2] The criteria of cure were fulfilled in 67 of the 80 patients in group 1 and in 9 of 18 in group 2—cure rates of 83% and 50% respectively. Over one-half of these patients were followed to eight months and almost a third to 10 months. Side-effects were common, the incidence increasing as the duration of the course was shortened, but they were not severe, and only in one of the 148 patients treated had the course to be abandoned, and he was receiving the most intensive. It is difficult to compare the effectiveness of different drugs, as the criteria of cure and period of surveillance are frequently not the same. Results up to 100% have been claimed for intensive sodium antimony tartrate and short courses of "miracil D" (lucanthone). It is generally agreed that the standard course of tartar emetic—30 gr. in 30 days—can be expected to give cures in 75–80% of patients. It is doubtful whether more than a 60% cure-rate can be hoped for using stibophen, although 70% has been obtained using intensive courses, and the most optimistic figure for anthiomaline is 50%, even when given intravenously. Side-effects have been greatly reduced by giving sodium antimony tartrate well diluted and slowly, but on occasions have been so severe following lucanthone that courses have been abandoned; this has especially been noticeable in reports from Egypt. It would therefore appear that sodium antimony gluconate can give a high rate of cure with mild side-effects and with the added advantages of a short course and an ambulant patient. The preparation has, however, to be given intravenously; oral administration has been tried unsuccessfully.

Our Expert replies: I agree with almost everything in Dr. Rowland's letter. His experience corroborates the statements given with answers to the original question. Even according to the figures he gives it may be deduced that persistence of symptoms following treatment with sodium antimony gluconate is commoner than after treatment with sodium antimony tartrate, for in his two series treated with the former there were cure rates of 83% and 50%, and, as he states, many workers have claimed a cure rate of 100% following treatment with sodium antimony tartrate. It should be pointed out, moreover, that few have found treatment with sodium antimony gluconate to bring about a cure in up to 83% of cases. Using a very similar dosage regime and method of assessing cure as that which Dr. Rowland found to bring about cures in 83% of cases, Messent,[3] working in Accra, obtained cures in only 55% of cases.

References

1 Rowland, H. A. K., *Trans. roy. Soc. trop. Med. Hyg.*, 1956, **50**, 565.
2 —— ibid., 1957, **51**, 157.
3 Messent, J. J., ibid., 1954, **48**, 351.

Extra Skin Crease.—Mr. Denis Browne (London, W.1) writes: The value your expert ("Any Questions?" June 14, p. 1432, and "Notes and Comments," September 20, p. 753) puts upon asymmetrical skin folds as indicating possible congenital dislocation of the hip leads to the conclusion that the 40% of babies having them should be *x*-rayed at birth; but, as the sign is obviously useless in regard to double dislocations, all the rest should be *x*-rayed as well. Perhaps it would be both cheaper and better to study the mechanics of this mechanical accident, with due regard to family history, and investigate accordingly. If this is done, it will be found that the "Ortolani click" on abduction, though a true sign of dislocation, is a rare one, just as is "telescoping." According to my ideas suspicion should always be aroused by a valgus moulding of the foot; the earliest diagnosis I have made (at 16 hours of age) was because of this.

Medical Blood Donors.—Dr. J. W. Todd (Farnham, Surrey) writes: In reply to the question whether or not doctors and nurses should enrol as blood donors, your expert states ("Any Questions?" August 30, p. 574): "It may be argued that some doctors and nurses lead a particularly strenuous life, and that they should be spared any additional physical burden. Probably they should be discouraged from acting as blood donors, although they should surely be allowed to give blood occasionally (perhaps once a year) if they express a strong wish to do so." He thus implies, first, that the lives of doctors and nurses are peculiarly strenuous, and, secondly, that giving blood is a physical burden. I suggest that both these propositions are untrue, and that doctors and nurses should be encouraged to act as blood donors to the same extent as are other people.

Our Expert replies: The phrase "it may be argued . . ." was meant to imply that the view stated was a not unreasonable opinion held by some people. I purposely included the word "some" before "doctors and nurses," wishing to emphasize that I did not consider that all of them led a particularly strenuous life, and I thought I had clearly implied that only those who *were* leading an unusually strenuous life should be discouraged from acting as regular blood donors. In the first paragraph of my reply (not quoted here) I pointed out that the chronic effects of blood donation are due mainly to iron depletion, although they can be adequately counteracted by taking iron. There is no doubt that, unless extra iron is taken, regular blood donation does produce iron depletion.[1–3] Thus blood donation is at least potentially a physical burden, although it is one which healthy people can most justifiably be asked to bear.

References

1 Laurell, C. B., *Acta physiol. scand.*, 1947, **14**, Suppl. 46.
2 Moore, C. V., in *Nutritional Anaemia*, edited by A. Lejwa, 1948. Robert Gould Research Foundation, Cincinatti, U.S.A.
3 Heistø, H., and Foss, O. P., *Scand. J. clin. Invest.*, 1958, **10**, 102.

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